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ABSTRACT

This research investigated variables that may influence effectiveness of the Supplemental Instruction (SI) learning assistance and enrichment program at the University of Missouri-Kansas City and other U.S. postsecondary institutions. The first study analyzed variables related to academic performance of students from the university (mean final course grades, rate of course withdrawal, and rate of persistence). Study two investigated variables at 735 U.S. postsecondary institutions related to academic performance of students and satisfaction level with the campus SI program. Independent variables included: administrative placement of the SI program unit (academic affairs, student affairs, or other); age of the SI program, fidelity of the program to SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, institutional involvement), and four dependent variables (mean final course grades, mean percent of "D" and "F" final course grades and course withdrawals, mean percent of students who participate in the program, and satisfaction level with the program. The first study found a positive correlation between higher academic achievement and persistence rates with the independent variables of SI attendance and measures of precollegiate academic achievement. In study two, there were statistically significant positive correlations with three of four program activity constructs and the effectiveness of the program regarding improved student outcomes and higher satisfaction ratings by campus administrators who supervised the program. Among the implications of this research is the identification of key activities that should be observed to maximize program effectiveness. Three appendixes contain survey correspondence, a survey questionnaire, and an extensive annotated bibliography of world related to SI. (Contains 290 references and 34 tables.) (SLD)

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EFFECT OF ADMINISTRATIVE PLACEMENT AND FIDELITY OF IMPLEMENTATION OF THE MODEL ON EFFECTIVENESS OF SUPPLEMENTAL INSTRUCTION PROGRAMS

A DISSERTATION IN
Urban Leadership and Policy Studies in Education
and
History

Presented to the Faculty of the University
of Missouri-Kansas City in partial fulfillment of
the requirements for the degree

Doctor of Philosophy

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EFFECT OF ADMINISTRATIVE PLACEMENT AND FIDELITY OF IMPLEMENTATION OF THE MODEL ON EFFECTIVENESS OF SUPPLEMENTAL INSTRUCTION PROGRAMS

David Ray Arendale, Doctor of Philosophy

University of Missouri-Kansas City, 2000

ABSTRACT

This research investigated variables that may influence effectiveness of the Supplemental Instruction learning assistance and enrichment program at the University of Missouri-Kansas City and other U.S. postsecondary institutions. Study number one analyzed variables related to academic performance of University of Missouri-Kansas City students (mean final course grades, rate of course withdrawal, and rate of persistence). Study number two investigated variables at 735 U.S. postsecondary institutions related to academic performance of students and satisfaction level with the campus Supplemental Instruction program. Independent variables included: administrative placement of the SI program unit (academic affairs, student affairs, or other), age of the SI program, fidelity of the program to SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, institutional involvement), and four dependent variables (mean final course grades, mean percent of

D and F final course grades and course withdrawals, mean percent of students who participate in the program, and satisfaction level with the program).

Study number one found positive correlation between higher academic achievement and persistence rates with the independent variables of SI attendance and measures of precollegiate academic achievement. The entire known population of 735 SI programs within the United States was selected for study number two. There were statistically significant positive correlations with three of the four program activity constructs (SI Supervisor Involvement, SI Leader Involvement, and SI Leader training) and the effectiveness of the program regarding improved student outcomes and higher satisfaction ratings by the campus administrators who supervised the program. There were no statistically significant differences between the different program administrative placement locations and the dependent variables. Implications from this research include identification of key activities within the program that should be observed to maximize program effectiveness for the institution and participating students.

Besides the two quantitative studies, an extensive review of the literature regarding the history of developmental education and learning assistance programs in the United States produced six discernable historical phases. Supplemental Instruction was placed within this social context in American history. The appendix includes an extensive annotated bibliography of 450 publications and other media types published by authors worldwide related to Supplemental Instruction.

This abstract of 350 words is approved as to form and content.

Dr. Eugene Eubanks, Professor of Education
School of Education

The undersigned, appointed by the Dean of the School of Graduate Studies, have examined a dissertation titled "Effect of Administrative Placement and Fidelity of Implementation of the Model on Effectiveness of Supplemental Instruction Programs," presented by David Ray Arendale, candidate for Doctor of Philosophy, and hereby certify that in their opinion it is worthy of acceptance.

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DEDICATION

This dissertation is lovingly dedicated to John and Leota Arendale, my parents, who taught me to love reading, honor God, pursue education, and serve others. Other important influences in my life are my friends Patrick and Mary Gordon who taught me how to invest in myself and enjoy life to the fullest. I cherish the encouragement and friendship of Sydney Stansbury who is my best friend and encourages me to pursue excellence in my personal and professional life.

CHAPTER 1

INTRODUCTION

Statement of the Problem

Supplemental Instruction (SI) is effective in improving the academic achievement and graduation rates of college students based on a review of research studies from the University of Missouri-Kansas City (UMKC) and hundreds of other institutions in the United States and other countries (Arendale, 1999). Of the SI research studies conducted over the past two decades, no research has been conducted regarding the following three areas regarding potential influence upon student academic behavior or campus administrator satisfaction with the SI program: (1) influence of the administrative placement of the SI program within the institution; (2) length of time that the SI program has been in existence; and (3) fidelity with implementation of the SI program by the postsecondary institution.

This research study is a result of a spirited debate among developers of the SI model at UMKC with those who have implemented the program throughout the U.S. and abroad. A frequent issue raised during these discussions is how much can the SI program at another college vary implementation of the program from the UMKC recommendations and still obtain satisfactory outcomes for students and high satisfaction ratings by the campus administrators in charge of supervising the SI program.

Beyond the extensive professional literature published over the past two decades concerning SI, UMKC conducts frequent multi-day workshops to train faculty and staff from other institutions how to implement their own SI program. Since the SI training workshops were first conducted by the SI staff at UMKC in the early 1980s, the training workshop has continued to increase in complexity and comprehensiveness. The training materials have increased both in number of pages and also detailed and specific recommendations for the SI program implementors to follow when starting the SI program at the institution. As each new Director of SI Training at UMKC has assumed responsibilities, each has supplemented previous training materials with new materials of their own creation based upon their professional judgement.

While the training materials within the larger professional literature has defined the SI model, there has not been a direct link made between specific recommended SI program practices and positive educational outcomes for the students and satisfaction ratings by campus administrators. This failure to investigate potential relationships between these independent variables (specific SI program activities and components) and dependent variables (student outcomes and satisfaction level by administrators) have led to considerable discussion within the profession. Exploration of this issue may help to explain why there are differences among SI programs regarding increased academic achievement for participating students and also serve as a follow-up research study for the few published reports of SI participation being ineffectual.

Some novice and experienced SI program administrators at other institutions plus some SI trainers within the National SI Center housed at UMKC have hotly debated this issue for many years. How many specific SI program activities described in the professional literature and recommended during the SI training workshops need to be observed to obtain satisfactory results for students and the institution? Which specific activities are more essential than the other ones? At what intensity level must these activities be implemented to obtain desired results? What is the least number of activities that must be implemented to obtain the maximum results wanted by the campus administrators and faculty members?

While it was common practice for SI programs to be administered by full-time staff members in the 1980s and early 1990s whose solve responsibility was to supervise the program, that pattern has significantly changed in recent years. Most new SI program administrators have a variety of other responsibilities beyond starting a new SI program. A new category of campus SI administrator are faculty members who are granted some release time from teaching responsibilities or are provided supplemental salary compensation in addition to their traditional responsibilities. These educators must be both effective and efficient with the limited time that they have to guide their SI programs. It is essential to identify the most important SI program activities to invest their limited time to obtain the highest student academic outcomes and meet institutional objectives.

This debate about the essential nature of SI and the critical activities that should be conducted to obtain desired results is part of a larger issue within education. While the professional literature, professional associations, and national conferences often identify "exemplary" educational practices for potential adoption by other institutions who wish to obtain similar outcomes, it is uncommon to see accompanying detailed research studies that identify the specific program activities that need to be followed to obtain the same results as reported by the original institution that created the educational practice. Which specific activities are essential to obtain the desired results? Which activities continue to be observed not because they are essential, but rather because they are part of the tradition and history of the educational practice? What practices may actually be ineffective or actually counterproductive to the desired results? What other variables may be involved in the success of the educational practice at the institution that created it that cannot be easily duplicated at other institutions?

Data from this research study may suggest that there is a preferred administrative placement for SI programs. This information would then encourage educators to be more knowledgeable about such preferences when selecting one administrative location over another for initiating or moving the learning assistance program within the administrative structure of the institution. Helping educators understand that one administrative placement may be more helpful for student service could assist in the improvement and increased effectiveness of the specific program to assist more students. With the present environment of limited funds for campus academic support and enrichment programs, it is important that campus administrators carefully select the administrative location for learning assistance programs to maximize their benefit for assisting students to be successful and retained through to graduation. Increased persistence toward graduation provides additional funds for the institution through student tuition, fees, and other purchases made by students who might otherwise drop out.

Besides gaining knowledge about administrative placement overall, this study may empirically identify critical SI program activities that should be followed to maximize the benefit of the SI program with improving student academic achievement and increasing satisfaction by the campus SI administrators regarding the efficacy of the program.

Without knowledge of relationships between administrative location and fidelity to the SI model, it is difficult to develop effective improvements in the SI model. This study may also spur similar studies for tutorial and other forms of academic assistance.

Research Hypotheses

There were two purposes of this research. The first was to investigate factors that may have a direct or indirect influence upon the effectiveness of the SI learning assistance and enrichment program to improve the academic performance of students that participate in the program (higher mean final course grades in the classes in which they receive academic assistance). The second purpose of this research was to identify practices that improve the effectiveness of the SI program and result in higher academic achievement for SI participating students and higher levels of satisfaction by the campus SI coordinator.

In Study #1 that focused on the SI program at the University of Missouri-Kansas City (UMKC), the major independent variables were demographic variables of UMKC students. The dependent variables were student grade achievement and persistence toward graduation.

In Study #2 that focused on the SI program at other postsecondary institutions in the United States that received training from UMKC, the major independent variables were administrative placement of the unit (academic affairs, student affairs, or other), length of time that the SI program had been in existence, and fidelity of the program regarding a set of SI program-related elements. The dependent variables were student grade achievement and satisfaction level of the campus SI coordinator with the SI program.

Theoretical Background

Supplemental Instruction is based upon several related educational theories. It is grounded in a developmental framework (Blanc, DeBuhr, & Martin, 1983). Vygotsky (1978, p. 86) through his framework of the Zone of Proximal Development helps to explain the dynamics within the group setting where participants are often able to extend themselves to higher levels of thought than predicted. The relationship between the SI leader and the SI participants is a practical expression of this framework. Tinto's research (1993) identified that successful integration of the student with the academic and social dimensions of the institutions were powerful influences for student persistence. Student involvement with peers is a common means for students to become integrated with the institution. Astin stated that "Generally, students tend to change their values, behaviors, and academic plans in the direction of the dominant orientation of their peer group . . . the student's peer group is simply the most potent source of influence on growth and development during the undergraduate years" (1993, pp. 363, 398). Metacognition learning theory states that effective learning is enhanced by learners who are both aware of learning tasks, knowledgeable of possible learning strategies, and skilled in their use (Weinstein & Stone, 1996). SI sessions commonly embed the use of metacognitive strategies. "Situated cognition" states that learning is most likely to occur when study strategies and academic content are dealt with within the context of a specific academic discipline. Immediate application of the study strategies must be made with the academic content if learners are expected to deeply master the strategies and be able to use them in other learning situations (Hattie, Biggs, & Purdie, 1996).

This research study employs current education research and evaluation theory to guide the quantitative studies. Study #1 examines variables that may be related to improved student outcomes such as higher academic achievement and increased persistence toward graduation. The Input-Environment-Outcomes (I-E-O) evaluation model was utilized for this study (Astin 1993, 1991, 1977, 1970b, 1970a, 1962). Outcomes (student characteristics after exposure to the environment) are related to the

Inputs (characteristics of the student at the time of initial entry to the institution) and interactions with the Environment (various experiences to which the student is exposed). Rather than a "true experimental" study where all variables are controlled and manipulated, Astin's I-E-O research model is "natural" study that looks at the students' interaction with the environment (e.g., participation with SI). This research design produces a correlational study of the relationship of the variables. The magnitude of effect should be proportional to the degree of exposure (Astin, 1993, p. 28).

Study #2 examines variables that may be related to student outcomes such as higher academic achievement and lower rates of course withdrawal. Additional, the satisfaction rate of the SI program by the campus administrators who supervises the SI program was also examined. This study assessed SI program implementation. King, Morris, and Fitz-Gibbon (1987, p. 9) argue that limiting evaluation to only program outcomes can potentially answer only the question of "did it work" and not the deeper question of "what worked and what did not" and how those variables contributed to the final outcome. "Program implementation research" focuses on the process of the intervention rather than only on the final product and potentially can yield much valuable information to permit program revision and improvement. This research has never been conducted regarding the implementation of the SI program at hundreds of institutions throughout the United States.

Operational Definitions

The following definitions are provided to give clarity to terms as they apply to this study. The first term (i.e., Supplemental Instruction) refers to the major subject under investigation with this study. The terms that follow the first one were used at different times in American history to describe similar activities and programs. However, each have been commonly interpreted differently by various members of the higher education community, public policy makers, students, and others. An extended treatment of their definitions is warranted based upon the historical foundations of this study. An understanding of their word origins and the contexts that each was created serves an introduction to the historical review of literature in chapter two of this dissertation.

Supplemental Instruction (SI)

"Supplemental Instruction" (SI) is an academic enrichment program that increases both academic performance and persistence toward graduation for students. SI targets traditionally difficult academic courses, that often have 30 percent or higher rate of D or F final course grades or withdrawals. Rather than focusing on "high risk students," all students are encouraged to participate voluntarily in these activities. Facilitated by a fellow student, SI provides out-of-class study review sessions that employ active and collaborative learning strategies to create an enriched learning environment where students increase their mastery of the academic content material and concurrently develop cognitive learning strategies that are transferable to other classes (Martin, Lorton, Blanc, & Evans, 1977).

Remedial Education

"Remedial education" was the predominant term used from the 1860s through the 1960s. Remedial education generally focused on specific skill deficits of students that were addressed. Clowes (1980) used the analogy of the traditional medical model when describing remedial education. Students were assessed for their weakness, then a prescriptive treatment was directed for the specific problem if the students were "academically backward or less able students" (p 8). Treatments were repeated whenever the desired results were not obtained. Students were seen as possessing many deficits in need of prescriptive remediation.

The College Reading and Learning Association Taskforce on Professional Language defined remedial as "instruction designed to remove a student's deficiencies in the basic entry or exit level skills at a prescribed level of proficiency in order to make him/her competitive with peers" (Rubin, 1991, p. 9). Remedial students were identified as "students who are required to participate in specific academic improvement courses/programs as a condition of entry to college" (Rubin, 1991, p. 9). Preparatory programs beginning in the 1700s offered remedial courses as a primary vehicle for preparing students for entry to college.

Compensatory Education

During the 1960s a new technical term was introduced through national civil rights legislation that resulted in the establishment of the Office of Compensatory Education within the U.S. Office of Education (Chazan, 1973). "Compensatory education" described activities which were introduced to "compensate" for a previous state of discrimination:

> Compensatory education in higher education would take the form of remediation activities such as preparatory and supplementary work . . . all with a program to provide an enriching experience beyond the academic environment to counterbalance a non-supportive home environment. (Clowes, 1980, p. 8)

It was believed by some that environmental conditions, often induced by poverty, were responsible for the poor academic achievement of some students. Front and Rowland defined compensatory education as "those efforts designed to make up for the debilitating consequences of discrimination and poverty" (1971, p. vii). President Lyndon Johnson's War on Poverty was also a war on the conditions that required compensation for the poor environment that fostered it. In addition, such an education sought also to provide an improved home environment which was believed to be a significant factor for future academic achievement (Maxwell, 1997, pp. 6-7; Ntuk-Iden, 1978, p. 45). Specific compensatory education programs such as TRIO, Equal Opportunity Programs, and others had their origins in the Civil Rights legislation of the 1960s. By federal mandate often the only students who could be served through such programs had to meet one or more of the following demographics: first-generation college students, economically-disadvantaged college students, and later, students with a disability. Frequently many later perceived that these college access programs became an official entitlement for these federally-defined subpopulation on the basis of race, ethnicity, and socio-economic status (Kerstiens, 1997).

Developmental Education

The predominant term of choice of many within the profession beginning in the 1970s has been "developmental education." This term was borrowed from the field of college student personnel. This term is more comprehensive regarding the student and focuses on development of the person with both the academic and social domains (Casazza & Silverman, 1996). Rather than focusing on the students' deficits, this model assumes that each student has talents that can be developed in addition to dealing with improving any weak skill areas. Developmental education assumes that all students are "developmental." "The notion of developmental sequence is the kingpin of developmental theory . . . A goal of education is to stimulate the individual to move to the next stage in the sequence" (Cross, 1976, p. 158).

The American Association of Community and Junior Colleges created a more expansive definition of developmental education. It recognized not only offering precollegiate-level courses (i.e., remedial courses), but other services which potentially serve all students wanting to increase their academic performance. Supplemental Instruction is listed as one of the services:

> Programs that teach academically underprepared students the skills they need to be more successful learners. The term includes, but is not limited to, remedial courses. . . . Effective developmental education programs provide

> educational experiences appropriate to each student's level of ability, ensure standards of academic excellence, and build the academic and personal skills necessary to succeed in subsequent courses or on the job. Developmental programs are comprehensive in that they access and address the variables necessary at each level of the learning continuum. They employ basic skill courses, learning assistance centers, supplemental instruction, paired courses and counseling. (AACJC, 1989, p. 115)

Rubin (1991) compiled a comprehensive collection of definitions by the College Reading and Learning Association related to the field of developmental education and learning assistance. These definitions have been accepted by the major professional associations in the field. The definition for "developmental education" in this document provides a broader perspective regarding the service area for the profession than the definition by the AACJC. Developmental education was defined as:

> 1: a sub-discipline of the field of education concerned with improving the performance of students. 2: a field of research, teaching, and practice designed to improve academic performance. 3: a process utilizing principles of developmental theory to facilitate learning. (Rubin, 1991, p. 4)

This definition has been revised by the National Association for Developmental Education, largest of the professional associations representing faculty and staff in the discipline. The scope of service by the profession was expanded to the entire student body at all levels of the institution:

> Developmental education is a field of practice and research with a theoretical foundation in developmental psychology and learning theory. It promotes the cognitive and affective growth of all learners, at all levels of the learning continuum. It is sensitive and responsive to the individual differences and special needs among learners. (NADE, 1996)

Cross expressed the differences between remedial and developmental education in the following way:

> If the purpose of the program is to overcome academic deficiencies, I would term the program remedial, in the standard dictionary sense in which remediation is concerned with correcting weaknesses. If, however, the purpose of the program is to develop the diverse talents of students, whether academic or not, I would term the program developmental. Its mission is to give attention to the fullest possible development of talent and to develop strengths as well as to correct weaknesses. (Cross, 1976, p. 31)

In the 1990s the perception of the definition of developmental education changed for some. Critics of developmental education equated it with compensatory and remedial education with the associated negative baggage that accompanied both of those terms. Maxwell noted that:

> . . . developmental education has become a euphemism for remedial with all the negative connotations that word implies. . . . Today, students taking developmental courses are stigmatized. . . in primary and secondary schools the term developmental education applies to programs for the mentally retarded. (In Piper, 1998, p. 35)

Payne and Lyman (1996) state that there is an "identity problem, if not an identity crisis" within the profession that is of such magnitude that renaming the profession again is an option to deal with the problem (p. 13). Much in the same way that "remedial education" engendered such negative reactions from policy makers in the 1940s through 1960s, developmental education has attracted similar negative status among a growing number of people in the 1990s. Some have argued that developmental education must grow in terms of its theoretical underpinnings and theory to reflect current scholarship (Lundell &Collins, 1999). Others have suggested a change to select "learning assistance," or some version of that term, as the new name for the profession and associated activities.

Learning Assistance (Learning Center, Learning Resource Center)

Another term that is used to describe the profession is "learning assistance." Alternative synonyms commonly used by educators for this term are "learning center" and "learning resource center." The term learning assistance was introduced in the professional literature during the late 1960s. Maxwell states that:

> Learning assistance has a broader meaning in that it refers to programs that offer academic skills help to all students -- from freshman to seniors and graduate students -- from those who need intensive work in reading to those preparing for graduate and professional examinations. Attendance in learning assistance programs tends to be voluntary and students in the programs do not suffer from the stigma of being viewed as 'dumb' as those taking remedial courses usually do. (In Piper, 1998, pp. 35-36)

Martin, Lorton, Blanc, and Evans (1977) echoed the position by Maxwell. The authors viewed the learning center in a much broader context with service both to the traditional enrolled college student body but also to the larger community within which the institution exists and interacts. The authors stated that:

> A learning center is by definition a research center which can enhance experimental efforts in many fields. The learning center is also a development center, keeping current with new materials and techniques and adapting them to fit the needs of members of the institution. A learning center can also be an extension center which reaches into the community. (p. 3)

The College Reading and Learning Association defined learning assistance as a similar broad program of service to many within postsecondary education:

> Supportive activities, supplementary to the regular curriculum, that promote the understanding, learning, and remembering of new knowledge, remediation for prescribed entry and exit levels of academic proficiency, and the development of new skills.. May provide study skills instruction, tutoring, reviews, supplemental instruction, study groups, special topic workshops, exam

> preparation, and various types of self-paced instruction, including computer-assisted instruction. (Rubin, 1991, p. 6)

Comprehensive learning centers were viewed as locations to serve remedial, developmental, and gifted students. Carbone (1987) stated the goals of the learning center should include, "development of the student's abilities to acquire and use information and enhancement of the teacher's ability to facilitate that development" (p. 24). Martin et al. (1977) had a similar vision, "It is the major goal of the learning center to reinforce the faculty by providing assistance and support whenever requested" (p. 12). It was common during the late 1960s and 1970s that learning centers provided alternative instructional delivery systems (e.g., audio cassette, video tape, independent study, computer-assisted instruction) for students from differing levels of previous academic achievement to study academic content material until they attained the level of mastery that they desired.

Learning centers were seen as having two activity areas: drop-in and out-reach. Drop-in centers attempted to meet the needs of students who came to a central location and requested assistance. Out-reach centers provided services at various geographic locations on campus, often in close proximity to the academic units that requested specific services customized for their stated needs.

Conclusion

Due to its creation in 1973, it is not surprising that Supplemental Instruction (SI) is an outgrowth of principles from developmental education and learning assistance.

Rather than operating from the deficit model of remedial education and the targeted subpopulation viewpoint of compensatory education, SI embraces the talent development viewpoint of developmental education and the vision from learning assistance that academic enrichment activities can be helpful for all students, not just those of assumed deficits or predictions for future academic failure.

CHAPTER 2

REVIEW OF THE LITERATURE

Overview of Chapter

This chapter provides a review of the literature that lays a foundation for this research study. The first section of the chapter provides a detailed review of the historical origins of activities and programs similar to Supplemental Instruction (SI) dating from the founding of the United States. Postsecondary institutions throughout the nation's history have provided developmental education and learning assistance programs analogous to SI to help meet the academic standards expected of admitted college students. This history is divided into six phases. The history provides a context for the creation of the SI model in 1973 at the University of Missouri-Kansas City. Educators at UMKC created SI as a response to immediate needs at the institution due to a high attrition rate among students enrolled in professional schools. The national dissemination of the SI model was due to it also meeting similar needs at other institutions as well.

The second section of this chapter is a detailed overview of SI. A comprehensive description of the SI program and its theoretical framework is provided. The third section of this chapter reviews research concerning the potential influence of administrative placement of learning assistance programs similar to SI within an institution. This is one research question in this study. This is a seldom explored area of research analysis. The final section of this chapter examines doctoral and masters' thesis research studies on SI to ascertain whether previous research has been conducted on the research questions in this study. One appendix in this document is an annotated bibliography of the approximately 450 publications and other forms of media related to SI. Little previous research has been conducted that directly relates to carefully analyzing the individual components or activities of SI programs related to student academic achievement and satisfaction levels of campus administrators with the program.

Historical Origins of Supplemental Instruction: The History of Developmental Education in American Higher Education

Overview

The central questions in this study are: (1) Is Supplemental Instruction (SI) effective in improving academic achievement and student persistence toward graduation for those college students that participate in the SI program? (2) What specific activities and components of a SI program are significant variables related to the effectiveness of such programs to helping students improve their academic success and the satisfaction level of campus administrators who manage SI?

Before exploring those two questions, a more general area for inquiry is to understand the historic relationship and context of SI to other forms of academic assistance and enrichment for students that have part of higher education since the 1600s in the United States. A review of the history of developmental education and learning assistance within the United States provides a framework to place SI within the broader context. "It can be asserted accurately that bridging the academic preparation gap has been a constant in the history of American higher education and that the controversy surrounding it is an American educational tradition" (Brier, 1984, p. 2). There are few comprehensive historical reviews on this subject in the professional literature. This historical review will be divided into six successive periods that will be described in the next section.

Before examining the six periods, there are several general historical observations that can be made about developmental education: (1) developmental education is not some phenomena of the second half of the twentieth century; (2) associating developmental education with a decline in academic standards is false; and (3) developmental education is a factor helping more students to earn higher grades and to complete college.

Some social historians argue that the history of education is primarily a record of the conflict between people who use informal and formal systems of enculturalism and education to maintain their economic, social and political power and of those who use the same processes to improve conditions for all people (Curti, 1959). Most historians state that the transference of culture occurred through both intentional and unconscious mechanisms:

> Family, community, and church together accounted for the greater part of the mechanism by which English culture transferred itself across generations. The instruments of deliberate pedagogy, of explicit, literate education, accounted for a smaller, though indispensable, portion of the process. (Bailyn, 1960, pp. 18-19)

While the specific activities and pedagogies that occur within postsecondary institutions have changed since the founding of the country, recurring themes and questions have accompanied each of the major periods. Casazza and Silverman (1996, p. 3) found that three common questions dominated each historical phase of American education, "What is the purpose of postsecondary education? Who should attend college? What should the curriculum look like?" These authors argued that American education slowly evolved as it gradually changed the answers to the questions. Casazza and Silverman believed that the continuous tension produced by the elitists and the reformers helped modify the purpose and delivery systems of education over time.

The class conflict evoked by the proponents of these two positions served as the catalyst for continuous experimentation and change within postsecondary education regarding effective practices for academically underprepared students who often composed large segments of the collegiate student body. Elitists laid the responsibility for student academic success with the student rather than the institution. Reformers, according to Casazza and Silverman (1996, p. 4), were stakeholders from outside postsecondary education who advocated more forcefully for students and their interests. These stakeholders had multiple political agendas and philosophical propositions that guided their actions: employers who needed a better educated and trained worker to meet higher demands of the workplace; philosophical advocates who believed that postsecondary education was a universal right of all those who lived in a democracy; those from a sociological perspective who saw the need for a diversity of advanced skill preparation for the new American society that required a more complex society which entailed an increased variety of roles required by society.

Some historians have unevenly recorded the historical events concerning developmental education in American postsecondary education. A historical review of this component of higher education suggests that many students throughout American history have been involved with different academic activities related to developmental education and learning assistance (e.g., academic tutoring, enrollment in remedial courses, participation in learning assistance centers). Yet, many historical accounts of American higher education nearly ignore this component in education that at times involved more students than those enrolled in official graduation-credit bearing college-level courses.

A possible explanation for this treatment is provided by Kammen (1997). He described the issue of "historical amnesia." Kammen quotes Ralph Ellison on this subject:

> Perhaps this is why we possess two basic versions of American history: one which is written and as neatly stylized as ancient myth, the other unwritten and as chaotic and full of contradictions, changes of pace, and surprises as life itself. (Ellison in Kammen, 1997, p. 164)

Kammen stated that beginning in the 1980s historians began to develop a literature that focused on the role of "collective memory" with the historical record of culture in America. He found that distortions of memory occurred for a variety of reasons, not just for cynical or manipulative motives (Kammen, 1997, pp. 199-200).

Kammen then engages in a long discussion concerning the similarities and differences between the "heritage phenomenon" and true history:

> The heritage syndrome, if I may call it that, almost seems to be a predictable but certainly nonconspiratorial response -- an impulse to remember what is attractive or flattering and to ignore all the rest. Heritage is comprised of those aspects of history that we cherish and affirm. As an alternative to history, heritage accentuates the positive but sifts away what is problematic. One consequence is that the very pervasiveness of heritage as a phenomenon produces a beguiling sense of serenity about the well-being of history. . . . (Kammen, 1997, p. 220)

Another perspective on this issue of memory distortion is offered by Thelen who describes the difficulty of accurate renderings of history, "The challenge of history is to recover the past and introduce it to the present. It is the same challenge that confronts memory" (1990, p. vii). The recovery process involves many choices by the historian regarding selection of materials that may be in contradiction with other historical records, and therefore subjects the process to the potential biases of the researcher. Historians who specialize in this area of study generally cite the Civil War as the most celebrated event of memory distortion. Frederick Douglass attributed the failure of the Civil Rights Cases of 1875 to memory distortion just a decade after the end of the war. "The historical memory of any transforming or controversial event emerges from cultural and political competition, from the choice to confront the past and to debate and manipulate its meaning" (Blight, 1990, p. 30).

The author of this research study has postulated that developmental education occupies an uneven, and generally invisible place in American education history for several possible reasons. Some may have ignored it since primary source material was not available due to the colleges not retaining it for study by historians and researchers. Others may have overlooked this aspect since as college students themselves they had not accessed these services and were generally unfamiliar with them or did not value them in comparison with other elements of the college experience. Another potential cause may have been that it was a high priority to focus on traditional topics and histories of the majority class and not those of women, students of color, and those of deprived academic and economic backgrounds. It also may have been due to the discomfort by some historians about the potential impact of its existence upon the institution of higher education since it suggests that colleges and universities were not effectively meeting the needs of its students.

Acknowledging the role and importance of developmental education presents potentially uncomfortable statements about the historical state of higher education: academic bridge programs were necessary to help students adjust to a college environment for which few were prepared; student subpopulations other than white privileged males often needed academic support systems to increase their chances for success since they came from disadvantaged and deprived backgrounds; the need for developmental education indicts the efficacy and effectiveness of elementary and secondary education; considerable sums of scarce financial resources and assignments of personnel were diverted from the institution normally spent on research and other scholarly purposes to provide academic development for underprepared students; and finally, that many students who dropped out of college and could have been retained through an effective developmental education program, instead left without every achieving their immediate academic goals and obtaining credentials that may have been critical to achieving life goals.

Handler and Gable (1997) explore the inclusion of accurate social history into the record as interpreted at historic sites and museums. They studied Colonial Williamsburg and the attempt by the contemporary managers of the historical enterprise to be more inclusive of previously excluded people and other social history topics such as slavery and treatment of people from lower socio-economic backgrounds. To announce the intent to change the way that history was portrayed at the site, the managers at Colonial Williamsburg decided to symbolically introduce some disorder into the environment to increase the authenticity of the experiences by more accurately reproducing reality:

> Road apples. There is no more evocative symbol for the current state of American history museums than the horse droppings that decorate the neat streets of Colonial Williamsburg -- America's premier outdoor history museum. Manure is authentic dirt, an instance and symbol of natural disorder. . . . The manure represents the coming of the new social history. . . . The museum would continue to celebrate American identity and American community, but it would no longer be silent about past injustices and their ramifications in the present. In short, the past that social history introduced into the museum was to be a dirtier past, both literally and metaphorically. (Handler & Gable, 1997, pp. 3-4)

The analysis by Handler and Gable provide an uncomfortable analogy for a detailed examination of the history of developmental education. Adapting their analogy, developmental education can be seen as part of the "dirtier past" of American higher education. Common participants in developmental education have been previously excluded people such as African-Americans, women, and people from lower socio-economic, first-generation college, and academically-disadvantaged backgrounds. Handler and Gable faulted Colonial Williamsburg for still continuing its "impression management" (1997, p. 31). The researchers stated that critical history has yet to be fully embraced at the institution. "Mimetic realism, the reigning historiographical philosophy at Colonial Williamsburg, destroys history" (1997, p. 224). The researchers implored that less energy should be placed on reproducing historically accurate door knobs and more attention spent on the role of previously excluded people.

Rosenzweig and Thelen (1998) in their national survey of Americans found that most perceived themselves to be deeply involved in history and preferred to "encounter" it rather than only relying upon interpretation of historical events by scholars who might be "creating their own truths" (pp. 32, 102). These encounters occurred through family discussions, genealogical research, looking/taking photographs, historical movies or television shows, museums and historical sites, historically-related hobbies or historical organizations. Direct participation was preferred to reading scholarly publications. Most wanted to connect with the history and bring personal meaning to themselves. "Respondants [to the survey] interrogated the past as they addressed the present" (p. 67). Developmental education was not "encountered" by most historians who chronicled the postsecondary education in America. Much of the history focused on administrators, faculty members, and school policies rather than on the student body.

Rather than aggressively telling the whole story, uncomfortable as that might be, Handler and Gable believed that the educational managers at Williamsburg had focused too often on accurate portrayals of superficial trappings of history. The researchers stated that accurate history would aggressively investigate race and class conflict topics and also assure that they correctly adorned buildings with period physical artifacts. The same could be claimed of some historians of American higher education concerning developmental education. How could the involvement by so many students over such a long period be virtually ignored by many historians? While it is dangerous to ascertain the silent motives of others, developmental education presents a sometimes uncomfortable facet of postsecondary education.

The following six phases of developmental education in American history are naturally interconnected with the social history that surrounds and interact with them. Each resulting historical phase included more student subpopulations that needed support in higher education through developmental education. Degler observed that social change is more likely to occur as a practical response to specific events rather than as the implementation of a well-developed ideology (Chafe, 1991, p. 172). Major events such as world wars, major migrations of people, economic trends, and federal legislation will play important roles with helping to foster changes in post secondary education. These currents of history will also naturally sweep developmental education in an evolutionary development as it adapts to meet immediate needs and survives the political forces that will war against its existence. Developmental education expanded its service to more students not due to an intelligent plan, but as a natural response to growing needs by an increasingly diverse heterogeneous college student body. Within this context Supplemental Instruction would be created later in the twentieth century.

TABLE 1

DIFFERENT PHASES OF DEVELOPMENTAL EDUCATION FOR COLLEGE STUDENTS IN THE UNITED STATES

Time Period	Name(s) Commonly Used With Activities	Students Predominantly Served During This Time Period
Mid 1600s to 1820s	Tutoring	Privileged White males
1820s to 1860s	Precollegiate preparatory academy and tutoring	Privileged White males
1860s to Mid 1940s	Remedial education classes within college preparatory programs and tutoring	Mostly White males
Mid 1940s to Early 1970s	Remedial education classes integrated within the institution, tutoring, and compensatory education	Traditional White male students, nontraditional males and females, and federal legislative priority groups: first-generation college, economically-disadvantaged, and students of color
Early 1970s to Mid 1990s	Developmental education, learning assistance, tutoring, and Supplemental Instruction	Previous groups listed above and an increase in older students who are returning to education or attending postsecondary education for first time
Mid 1990s to Present	Developmental education with expansion into enrichment activities, classes and programs	Previous groups listed above and an increase in number of general students who want to deepen mastery of academic content material

Phase One: Education for the Privileged White Male, Mid 1600s to the 1820s

The first colleges such as Harvard (established 1636), William and Mary (1693), and Yale (1701) had as their main purpose the replication of postsecondary education from Europe. Among the goals of such an education was to preserve newly imported European cultural norms, training of the clergy, and creation of the new ruling elite. With the late creation of the U.S. federal government during this period, there was little involvement with postsecondary education other than to not interfere with it. Few members of American society aspired to postsecondary education since few occupations required such additional training Most young adults followed the family with apprenticeships in trades or continuing their participation with the family farm. Higher education had little appeal outside of the White male aristocracy.

Some commentators find it ironic that while the American Revolution was purporting to establish democratic rights for all citizens, many were excluded from potential participation in postsecondary education (Casazza, 1999). Religion was viewed by many as the foundation for building of the American culture and transferring the best of European ideals to the New World. This process was more strongly assured through the predominant employment of college faculty members who were clergymen and had often been trained in European postsecondary institutions.

Focus on Privileged White Male Students

The number of students enrolled in postsecondary education was quite modest, somewhere near several hundred students in nine colleges at the time of the American

Revolution. Most of these students were preparing for the clergy. Nearly all students were white males from privileged families. Concurrently a few women attended "finishing schools" to prepare them for marriage to men of high social standing (Roueche & Roueche, 1993, p. 23). Higher education would remain primarily a wealthy Caucasian male enterprise until the American Civil War.

This focus on creating a new ruling elite in the young American republic is illustrated by a speaker at a seventeenth-century Harvard commencement address. The speaker was pleased that Puritan settlers had established Harvard; otherwise:

> The ruling class would have been subjected to mechanics, cobblers, and tailors, the gentry would have been overwhelmed by fellows of the baser sort, the sewage of Rome, the dregs of an illiterate plebs which judgeth much from emotion, little from truth. (Miller, 1939, p. 84)

Though official college admission policy was only to accept students from a wide diversity of socio-economic backgrounds, nearly all students who attended Harvard were white male students from wealthy parents of the privileged class. High tuition costs effectively excluded nearly all other students. There were some very limited attempts of providing access to other student populations. Approximately ten percent of the students at Harvard were from families of artisans, seamen, and servants. These students had their tuition paid either through work or assessments on the more wealthy students (Brubacher & Rudy, 1976, pp. 39-40).

Very few Native Americans were fellow college students in early schools. Some elitists thought that enrollment of them in college was a way to 'civilize' them and turn them into the "White man's Indian." Enculturalism could serve as another means for colonizing the Native Indian population again. "The Indian according to Jefferson was both noble and savage . . . education could reform the capacity for destruction and nurture the inclination for beneficence" (Hellenbrand, 1990, p. 128).

Several institutions had stated interest in enrolling Native Americans. William and Mary College had a quota for enrollment of this population. The original purpose of Dartmouth College was the training of Native Americans. An Indian College was founded at Harvard in 1654/1655 to serve as an educational outreach to the local Native American population as required by the university's charter. The Society for Propagation of the Gospel in New England was a primary promoter of the Indian College. However, the results of this experiment were dismal. Only one Native American graduated from Harvard at this time and died of consumption a year after graduation (Cremin, 1970, p. 223). The president of Harvard canceled the Native American program since the building that housed the Harvard Indian College was little used and because of the "unspoken assumption that the Indians should aspire to the same social and cultural ends as the whites" (Cremin, 1970, p. 222). This early symbolic interest in providing postsecondary education for Native Americans was not matched with practical educational programs that would prepare them for academic success at the institution. Few Native Americans would be admitted to any institution in the United States, and only a handful graduated during the 1600s and 1700s (U.S. Office of Education, 1952).

This practice of admitting students to satisfy political or public relations purposes without providing the corresponding academic support programs essential for academic success and eventual graduation would be a pattern often replicated throughout the history of American higher education. Institutions could claim political and public relation victories by admitting students without publicly revealing the dismal record of graduation rates. The American press and public opinion seldom demanded this accountability until the 1970s with the rise of the education accountability movement that began in elementary and secondary education with the publication of the "Nation At Risk" report on the deplorable state of educational outcomes in public education.

There were few advocates for African-American education among the Caucasian aristocracy and there are no reports of all-Black schools in the seventeenth and early eighteenth century:

> . . . the doors of wisdom were not only not open, they were shut tight and designed to remain that way . . . by the end of the colonial period there was a well-developed ideology of race inferiority to justify that situation and ensure that it would stand firm against all the heady rhetoric of the [American] Revolution. (Cremin, 1970, p. 412)

In most southern states it was illegal to teach African-Americans to read or write. The first recorded Black college graduate was in 1826. Only a few institutions in the North permitted Blacks to be admitted to college with only 28 having graduated by the beginning of the Civil War (Franklin, 1947, p. 228; Johnson, 1938, p. 7). Even among well-intentioned Caucasian majority institutions, the academic success of minority and underrepresented students was disappointing.

Concurrent with the early development of postsecondary education to create the new political and social leadership in America was the recognition of the benefits of further education in the military for increasing its readiness and effectiveness during war. Remedial education has been an often unrecognized component of preparation of many in the American military throughout the history of the country (Anderson, Harding, & Kime, 1992). Lack of basic skills regarding reading and writing were frequently cited as dangerous attributes for the militia and soldiers since they would be less prepared to think critically, read essential documents and maps, and follow orders from superiors. Wilds (1938) described the efforts by General George Washington during the Revolutionary War to provide basic reading instruction for the illiterate soldiers following their encampment at Valley Forge. In the eighteenth century it was common for military chaplains to be selected for both their skill with Bible teaching and the ability to teach military recruits to read (Duffy, 1985; White, 1968). In the twentieth century the military recognized the need for additional academic preparation for some students admitted to officer training schools. For this purpose the military established the United States Military Academy Preparatory School at Fort Monmouth, New Jersey, United States Naval Academy Preparatory School at Newport, Rhode Island, and United States Air Force Academy Preparatory School in Colorado Springs, Colorado.

Tutorial Assistance

Developmental education in America was created in response to the creation of admission requirements at post secondary institutions. Nearly all students seeking admission to college were unable to be fully admitted due to deficiencies in foreign language requirements of Latin and Greek. This is not surprising considering the dismal or nonexistence status of public education.

Students seeking admission to Eaton or Oxford in England would sometimes attend a "dame school" to prepare them for the rigorous college admission's test. These boarding schools were small tutorial centers run by educated women of high social standing. In colonial times, some Virginia aristocratic families sent their children to such schools in England to prepare for the admission tests at American postsecondary institutions. This practice was modified by some American clergymen taking on the same role, by that eliminating the need for children to leave the country for such academic preparation programs.

Precollege academic assistance for most students at Harvard and Yale commonly consisted of private tutors who prepared them for college entrance examinations of Greek and Latin along with evidence of good moral character:

> In 1642 Harvard required its freshman students to be able to understand and read at sight some Latin author of the difficulty of Cicero, be able to speak Latin in prose and poetry, and be able to decline Greek nouns and conjugate Greek verbs. (Butts & Cremin, 1953, p. 122)

In the mid 1700s Yale required proficiency on an arithmetic exam besides the above requirements and other postsecondary institutions soon followed. By the late

1800s beyond the original trio of Latin, Greek, and mathematics, an additional trio of subject areas were added for assessment: history, geography, and English (Broome, 1903). If students had not attended Latin grammar schools, another common academic preparation program at Yale was for a prospective student to stay with a minister for private tutoring until the student felt that he had been sufficiently readied for the college entrance exam (Cowie, 1936, p. 5). This was on a small scale a similar experience to the previously described dame schools in England.

Review of many college admissions catalogs from this era suggest that postsecondary admissions standards have increased their rigor as the public elementary and secondary school movement spread across the U.S. Since most postsecondary institutions at this time were elitist institutions that sought to selectively admit only a small segment of potential postsecondary students, college admission standards were generally higher than the skill and mastery level of average high school graduates. This historic imbalance of expectancy and reality has ensured the continuing needs for developmental education and other forms of academic assistance.

Once admitted to Harvard, most students continued to receive tutoring since the most assigned readings and textbooks were written in Latin and many college lectures were delivered in the same language by the professors. Even among the more wealthy White families, verbal and written competency in Latin was unusual. Therefore, it is not surprising that Harvard University was also the first postsecondary institution in

America to require remedial studies for most of its freshman class of students (Boylan & White, 1987).

After admission to prestige colleges such as Harvard and Yale, it was frequently the practice to assign many students to the same tutor for a group tutorial session. This practice did not provide for any differentiation during the tutorial session based on individual student strengths, weaknesses, and academic content mastery level. The tutor's primary role was to read aloud the lesson material and then to conduct a recitation session to detect if the students had correctly memorized the text. This practice failed to meet the needs for both the most gifted and also the most needy since it focused on the average students' mastery level of the academic content material. There is no evidence in the literature then for the efficacy of this crude and primitive form of academic assistance. A pamphlet published by a Harvard professor in 1825 described this practice:

> The attempt to force together sixty or eighty young men, many of whom have nothing . . . in common . . . and to compel them to advance . . . (at the same pace) . . . giving to the most industrious and intelligent no more and no other lessons, than to the most dull and idle is a thing that is unknown to the practical arrangements for education in other countries. (Ticknor in Butts & Cremin, 1953, pp. 225-226)

Many of these early tutors were low-paid members of the faculty. It was common experience among these early colleges that salaries were very low for all the teaching staff. "Indeed, tutors were paid so little that except by remaining celibate during their tutorship they could not have made ends meet" (Brubacher & Rudy, 1976, p. 37). Gradually this role of tutor began to be assumed by older students at the institution. For example, at Princeton University some graduate students were given the responsibility and title of a preceptor to conduct informal study groups that encouraged students to master the lecture material more deeply and engage in further academic discourse (Maxwell, 1979, p. 59).

Changing College Admissions Standards

Economics intervened regarding academic admission policies during the late 1700s. Due to the social norm of only considering Caucasian male students from families of high prestige who often possessed little secondary education, most postsecondary institutions in the 1600s until the American Revolution found it in their financial interest to admit students who were less prepared academically since they had the student fees for enrollment purposes. The president of Vassar College stated that "the range of student achievement extends to a point lower than any scale could measure" (Brier, 1984, p. 2). By the time of the American Revolution, institutions began to differentiate themselves by academic preparation levels of the incoming college students plus their officially stated mission statement. Institutions such as Amherst and Williams were founded to accommodate students who could not afford nor be accepted by Harvard and Yale due to their lower academic preparation levels (Casazza & Silverman, 1996). Unofficial segregation policies and procedures were established based on stereotypes of perceived academic inabilities by students and to exclude others that the institutional power elite did not favor such as females and students of color. The students at Williams were described by Nathaniel Hawthorne as "rough, brown featured, schoolmaster-looking, half-bumpkin, half-scholar, in black, ill-cut broadcloth" (Rudolph, 1956, p. 47). These assumptions, based on racial and class prejudices by key college policy makers besides inconsistent anecdotal information, would foster differentiation among postsecondary institutions for generations to come.

Institutions that were unable to create academic preparatory departments for students to attend before admission to the institution commonly required students who were judged to be underprepared to enroll concurrently in remedial classes along with their college graduation credit courses and to meet regularly with tutors (Brier, 1984). This placed increased pressure upon the students to both master foundation knowledge plus understand new material upon which it was based.

An illustration of the challenge of dealing with the increasing diversity of academic preparation levels of incoming students is provided by an incident involving Ezra Cornell, founder of Cornell University. Cornell asked the faculty member in charge of student admissions why many students were failing the admissions examination. The response was that the students did not know enough. Cornell then asked if the university could teach the students the content that they did not know for the examination. The discussion escalated when the faculty member replied that the faculty was not prepared to teach the alphabet. "Can they read?" asked Cornell. The professor's response was that if Cornell wanted the faculty to teach spelling, he should have found a primary school and not a university. Historical records suggest that admission policies changed at the university because of this interchange between Cornell and the faculty member. While the University's official regulations and policies only permitted admission to qualified students who displayed their academic preparation by passing the college entrance examination, applicants who failed the assessment might be provisionally admitted to the institution with the requirement that they would retake and pass the entrance exam. The Cornell University faculty minutes record that in 1864 a faculty committee on "doubtful cases" was created to make rulings on admission of marginal student applicants (Brier, 1984, p. 3).

When reviewing the history of postsecondary education in America, the elitists and reformers generally were in constant disagreement regarding standards by which to judge the academic fitness of the collegiate student body. Elitists resisted alternative methods of accommodating students from a more diverse background and preparation level. Reformers such as Francis Wayland, President of Brown University, sought to broaden the mission of his university through offering extension courses to students, despite their performance on admission tests and fulfillment of other criteria. The program was stopped in 1854, when "unmistakable evidence began to accumulate that the quality of the student body was deteriorating" (Brubacher & Rudy, 1976, p. 107). This threatened the interests of the traditional stakeholders in the institution.

The belief that the presence of less academically prepared students would both reduce the quality of the student body and reduce the rigor of the academic program is a theme often stated by the elitists to today. Many of them argue for the exclusion of those perceived to be less academically prepared to avoid the potential consequences.

Even the introduction of the Bachelor of Philosophy and Bachelor of Science degrees were viewed by many elitists as reducing the level of academic excellence of the academy since they were alternatives to the more rigorous traditional liberal arts degree that focused on a classical curriculum (Brubacher & Rudy, 1976).

Phase one of developmental education was characterized by the need to provide tutoring for nearly all students both to prepare for college admissions tests and also survive the rigorous college courses. The student body was very homogeneous as it was dominated by White male students from privileged socio-economic backgrounds.

Phase Two: Rise of the Precollegiate Preparatory Academy, 1820s to 1860s

Expansion of Postsecondary Education

Some historians have identified several elements of Jacksonian Democracy that had impact upon American society in the early half of the 1800s. Many impacts favored the common person through extension of voting privileges, support to expand the middle class workers and small shop owners, and extension of education for more people in society. One application of Jacksonian Democracy was expansion of postsecondary education through common schools, public education, and an expanded curriculum for more people in the middle class rather than its previous prejudice of serving the upper class who were Caucasian. Besides the rising American aristocracy, some from the White middle class were also encouraged to seek a college education. Jefferson emphasized that education would create an aristocracy of talent to replace the old aristocracy of inherited power. This is often called "meritocracy" since power would flow to those who were skilled and had merited additional influence, power, and responsibility. This helped to foster egalitarianism since individuals would be treated more equally based on personal skill rather than on the basic of their parentage. It became clear during this time that expansion of postsecondary education was essential to support the development of the economic middle class of merchants, tradesman, engineers, agriculturalists, and scientists to meet the needs for the growing nation and to support its economic development. This intersection of interests among political progressives and economic forces would again favor use of developmental education as a means to ensure higher productivity of colleges to graduate enough skilled workers and leaders. In 1837, Massachusetts was the first state to establish a comprehensive network of free public elementary and secondary schools in America (Roueche & Baker, 1987). However, the federal government took no tangible steps to encourage the expansion of postsecondary education through either financial support or legislative action. While national political leaders advocated for increased access and participation in postsecondary education, there was little tangible support for achievement of these goals.

With the increasing dispersion of the American population westward, the need to support the concurrent expansion of postsecondary institutions throughout the country was essential for a variety of reasons (Van Deusen, 1966). Many of the new towns needed the same components that suggested civilization to the new inhabitants: churches, businesses, public education, and a postsecondary institution. The quality of these new institutions, especially those located on the western frontier, were at best uneven and often worse (Blum, et. al., 1968, pp. 478-479). These new colleges drew upon potential students in the area, therefore demanding the provision of remedial education courses and other forms of academic assistance to meet the needs of these academically underprepared students.

However, with the poor or nonexistence of secondary and sometimes primary education, many of these new potential college students could barely read and write (Craig, 1997). Some researchers have noted that the number of those who provided and the number who received tutorial assistance was nearly identical to the number of teaching faculty and their enrolled students (Brier, 1984). This helps to document the massive involvement of developmental education with the entire educational enterprise operating at the postsecondary level.

The Yale Report of 1828 argued forcefully that the extreme academic challenge of learning Greek and Latin would naturally lead to development of the mental power and character of the student, thereby promoting the student's success in life (Brubacher & Rudy, 1976, p. 105). The Report stated that the admission of less academically prepared students to the institution would result in most of them not succeeding with the rigorous curriculum. Therefore, such students should be denied admission to the institution to save wasted time by the students and squandered institutional resources. Institutions that provided an alternative curriculum to the classical coursework were often denounced:

> When in 1828 Union College adopted a parallel track which allowed the substitution of modern languages for Greek, it was attached as "the dumping ground of substandard students and scholastic derelicts." Lawrence Scientific School was branded "the resort of shirks and stragglers." (Levine, 1996, p. 40)

This great debate over the rigor of the college curriculum and the participation of underprepared college students during this time delayed the widespread introduction of college-level remedial courses and the creation of the academic preparatory academy. Strong proponents of elitism in postsecondary education prevailed temporarily with the argument. Harvard University's leadership in permitting elective courses in place of some required curriculum offerings allowed the introduction of remedial courses for selection by college students. While Harvard University's curriculum change in the early 1800s was not designed with developmental education specifically in mind, the result was the same. It would take several decades before the developmental education course elective options would be made available for the students. Before this, there was no opportunity to select elective remedial courses since the fixed curriculum prescribed the same slate of classical courses for all students to take, no matter their unique individual needs for development of improved learning strategies and mastery of fundamental academic content material.

There was a growing reaction against the elitist view of only offering a fixed and prescribed curriculum for all college students. With the creation of a more flexible curriculum with provision for selection among approved elective courses, developmental education became a practical option for many students. As colleges began to open their doors to a more diverse student body of varying academic preparation levels, the provision of opportunity to enroll in remedial courses was essential to meet their need and also provide these courses for the traditional study body who also had similar unmet academic needs. This model of a flexible curriculum would be adopted by most institutions in America. A Massachusetts legislator complained:

> A college should be open to boys who seek specific learning for a specific purpose. It should give the people the practical instruction that they want, and not a classical-literary course suitable only for an aristocracy. (Morison, 1936, p. 287)

This value clash led to a variety of innovations and reforms within higher education. One of those was the preparatory studies department.

Creation of Preparatory Academies or Departments

In 1830, New York University (New York City) created an early prototype of an academic preparatory academy. This academic unit provided instruction in math, physical science, philosophy, and English literature (Dempsey, 1985). However, the main focus was on the acquisition of basic academic content knowledge and not cognitive learning strategies that are often prerequisite for mastery of new academic content material as identified by cognitive psychologists of today.

Tutorial programs were the common forms of academic enrichment and support at the most prestigious institutions such as Harvard and Yale. As larger numbers of academically underprepared students were admitted to the secondary and tertiary tier postsecondary institutions, it was recognized by many college administrators that a special department was necessary to accommodate and meet the academic needs of these students. For these less selective institutions, the number of underprepared students sometimes outnumbered the "regular" college admits. For example, at the University of Wisconsin in 1865, only 41 of 331 admitted students were in "regular" college-level courses that counted toward graduation requirements (Shedd, 1932, pp. 136-137). This is expected since the quality of primary and secondary education was very uneven, or even missing, in many parts of the United States. Colleges were often forced to provide instruction in the basic skills of spelling, writing, geography, and mathematics since they were the only venue for such organized instruction (Brier, 1984). Instruction in these basic content areas for the underprepared students often lengthened the undergraduate bachelor's academic degree to six years or more (Casazza & Silverman, 1996). When examining the length of time taken for students to successfully complete their undergraduate degrees, it is not common practice for the experience to be completed in four consecutive years. However, in recent years some policy makers have leveled criticism at developmental education since it contributes to a longer time to complete the academic degree due to the enrollment in remedial courses.

Most researchers cite that the first modern developmental education program was established at the University of Wisconsin in 1849. The Department of Preparatory Studies focused on instructing students in the basics of study skills. Remedial courses in reading, writing, and arithmetic were provided for students to enable them to succeed with graduation credit courses. This was the first systematic program to accommodate and ready underprepared students. The program was established since the number of tutors was not sufficient to meet the academic needs presented by many members of the student body. Most of the students at the University were enrolled in the program. Of the 331 students enrolled at the institution, 290 were enrolled in one or more remedial courses in the Preparatory Studies department (Brubacher & Rudy, 1976). This Wisconsin model of academic assistance and developmental education was adopted for use at other institutions across the U.S. (Brier, 1984). The department persisted until the 1880 when it was disbanded due to internal political battles rather than charges of ineffectual outcomes for participating students.

In the mid 1800s, Vassar College created an academic preparatory department to deal with students who lacked academic preparation for college courses. Faculty appointments to teach preparatory classes and the students who were enrolled in the precollegiate program grew quickly in number, by 1876 more than 45 percent of all Vassar students were enrolled in one or more remedial classes in the academy. The high percentage of student enrollment and corresponding level of faculty staffing drew scorn from many traditional faculty members who taught college-level courses. Increased curriculum articulation and discussion with the major feeder high schools to Vassar helped to develop more effective college-bound high school curriculums. The overall improvement of the quantity and quality of secondary schools across America was a dominant theme of the latter portion of the 19th century. By the turn of the century the academic preparatory academy was ended at Vassar due to the perception that most of high school students who applied for admission to Vassar had sufficient academic preparation (Roberts, 1986), though there were no documented studies to validate that assumption. This same assumption has been advanced again a century later in the 1980s and 1990s with the perceived improvements in high school curriculum standards. Policy makers have made the too often erroneous assumption that higher quality instruction in high school would automatically enable most newly admitted college students easily meeting or exceeding academic standards of the college professors. While the quality of high school instruction may have risen, generally the academic expectation levels of many college professors had risen at a faster face, continuing or even widening the gulf between expectancy by the institution and the reality presented by the majority of new students.

The movement to establish academic preparatory departments in most postsecondary institutions accelerated quickly by the end of the nineteenth century. Canfield (1889) estimated that more than 80 percent of the nearly 400 postsecondary institutions in the U.S. had established some sort of college preparatory program by 1889. These academic preparation departments became important in bridging the gap between the academic preparation of many high school youth and college-level entrance expectations (Clemont, 1899). A review of college admission documents suggest that the further west that the institution was geographically found, the lower the academic entrance requirements for the institution. In 1894 more than 40 percent of the 238,000 first-year college students were enrolled in college preparatory courses (Ignash, 1997).

The concurrent challenges of prevalent poor secondary school academic preparation for all but the most privileged students and uneven policies for college admission decisions at many postsecondary institutions created an academically underprepared first-year class of college students. Lax college admission criteria were partly due to the need to sufficiently fund postsecondary institutions since there was low financial support from the state and federal government for ongoing budgetary needs. While institutions may have received land and funds to initially construct the campus, ongoing governmental funds for salaries and expansion were often lacking. Many of these new institutions had insufficient financial capital to absorb the fiscal needs presented by academically underprepared students who needed extensive academic assistance and a wide program of remedial courses. These college preparatory programs had the unanticipated beneficial consequence of serving as models for secondary school instruction across the country and serving as their surrogate until secondary schools were fully developed by their local communities (Boylan, 1988).

Another factor which increased the need for academic preparatory programs was the increasing rigor of the college curriculum. Expectation levels often increased faster than many secondary schools could prepare the students to meet or exceed assumed core curriculum mastery levels. College courses which were formerly reserved for the upper division of the undergraduate curriculum were now expected by many postsecondary institutions to be capstones for high school. For example, in 1720 geometry was a senior-level course at Yale. By 1743 the course was placed at the sophomore level and then it was part of the freshman curriculum in 1825. In the mid 1850s the expectation was that the course was to have been mastered in high school (Wyatt, 1992). This increasing expectancy level continued to fuel the need for college remedial courses and academic preparatory programs.

Another factor increasing the need for preparatory programs was the increased access to the printed word for students. While most of college education in the 1600s and 1700s was presented through an oral tradition of the lecture and recitation, during the 1800s the library and its holdings became a primary area for knowledge acquisition. New subject areas in the humanities and the sciences during the 1880s required reading large volumes of print materials. Deficient reading skills of many students now became exposed and the need for their remediation was amplified (Dempsey, 1985).

An alternative to the academic preparatory programs at the college-level was attendance at separate private "tutoring schools." These were private enterprises that operated remotely from the college campus and provided private tutoring for an additional fee to students. Tutoring schools fulfilled several basic purposes: tutoring assistance for students who were currently enrolled in college; intensive development in entry-level college academic material; and preparation for college entrance examinations. Cascadilla School in Ithaca, New York is an example of such an institution. An additional purpose of these schools was to provide college faculty members a venue to earn extra income to supplement their meager salaries provided by the colleges. Professors Wait and MacKoon from Cornell University founded the Cascadilla School. These schools became the precursors of the highly-profitable private schools such as Sylvan Learning Systems and Kaplan Test Preparation Program (Brier, 1984, p. 4).

The importance and degree of institutionalization of academic preparatory academies was documented by a study that found that by 1895, nearly 40 percent of all college students were directly admitted from the institution's own college preparatory department (Rudolph, 1977, p. 158). It appears that many colleges had developed such academic preparatory schools to prepare future college students for successful admission and persistence toward college graduation. This would therefore enable these institutions to economically survive through payment of tuition and fees by these formerly academically underprepared students. The poor quality or nonexistence of public high schools created a demand for some college-bound preparation program:

> Insisting upon erecting colleges that neither need nor intelligence justified, college governing boards [before the Civil War] often had the choice of giving up or of taking any student who came along and starting him at whatever point his ignorance required. The result was that a college might not get around to a graduating class until it had been in operation for as long as eight years, in the meantime it had become the classical academy as well as the college for the district that it served. (Rudolph, 1962, p. 282)

This symbiotic relationship between the local college and the function of providing secondary education served as a model for similar relationships during contemporary times. Considerable attention was generated by the press regarding the formal relationship established by Boston University and the local public school district in the 1990s. The school board contracted with the college to help manage part of the school district. Actually similar examples occurred nearly 100 years earlier in various locations throughout the country between secondary and postsecondary institutions who formed partnerships for mutual benefit.

A final reason for the creation of the academic preparatory academies was an indirect economic benefit to the institution through enrollment of a new group of students. There have been several periods in American higher education when campus administrators enrolled academically underprepared students who normally would not have been admitted to the institution, but the institution modified admission standards to enroll this new class of students to receive their tuition and other fees. This decision to pursue developmental education students for recruitment to the institution most recently occurred in the 1970s when colleges sought to replace the former college students from the post World War II baby boom generation. During this time the colleges sought to attract and retain a variety of student subpopulations often overlooked in the past: women, first generation to attend college, academically-underprepared, and older adults returning to college or attending for the first time. In the one hundred years before the Civil War, nearly 700 institutions were closed due to budgetary concerns (Wyatt, 1992). It was not unusual for the business and academic interests of the academy to conflict with one another. While it was in the financial interest of the institutions to admit a diverse student body who were able to pay the tuition and fees, the prevailing campus culture might be in opposition to providing the level of academic support services needed for their long-term academic success and eventual graduation from college.

It appears that the first time that colleges aggressively pursued the academically-underprepared for recruitment was during the American Civil War. Economic and social changes in American society in both the North and South created by the Civil War had a significant impact upon the expansion of developmental education with many colleges and universities. Many male students failed to seek admission or left college during the Civil War to join their respective armies. Many colleges in both the North and South sought to replace them and their student tuition payments by expanding their institution's academic preparatory departments by recruiting underage students who could not yet serve as soldiers. For example in the North, the number of students enrolled in the academic preparatory department at Valparaiso University in Indiana grew significantly during the Civil War. While the liberal arts college and theology school at Bucknell University in 1863 closed temporarily, the academic preparatory school significantly increased its enrollment, thereby saving the school economically according to school documents. Southern colleges followed the same pattern of Northern institutions through extended academic preparatory departments and the admission of students formerly denied admission. The University of Alabama in 1861 created an academic preparatory department for boys 12 years or older. In 1863, the University of Georgia created University High School and suspended rules against admission of boys less than 14 to the University. The Faculty Senate of South Carolina College in 1862 voted to admit young students to replace revenue lost by the men who joined the Confederate Army (Rudy, 1996, pp. 69-70, 91).

Phase two of developmental education was dominated by the move from individual tutoring to the development of academic preparatory academies that helped to strengthen students' academic knowledge and skills before entry to the college curriculum. While such precollegiate academic preparatory academies were popular, the professional literature does not contain empirical research studies that document their effectiveness for graduation rates of these academically underprepared students. It does appear that the academies were effective in preparing students for initial admission to the institution. While common logic supports the essential need, educators were either unable or unknowledgeable on how to evaluate their effectiveness regarding improving academic performance of students.

Phase Three: Introduction of Remedial Classes to the College Curriculum, 1860s to 1940s

A common theme of this period is the direct involvement of the federal government with postsecondary education. This was the first time that the federal government had this type of highly supportive relationship with postsecondary education. This was due to the more enlightened view by many policy makers that it was essential to produce a more skilled workforce to improve the devastated national economy following the Civil War and to provide the intellectual capital needed to fuel the industrial revolution. Previously the government had sought to not interfere with private postsecondary institutions as they trained clergymen and provided a small number of intellectual leaders for the country. The rapid change in the American economy from a predominant agriculture to a growing industrial base raised the aspirations of many young people to pursue postsecondary education. Higher education was seen as essential for participation in the new economy and growing needs presented by job opportunities in the rapidly growing urban cities in the East and Midwest.

Significant events during this period are the First Morrill Act, the Second Morrill Act, financial support for what would become Historic Black Colleges and Universities (HBCU), and the growth of junior/community colleges. This era would see a tremendous growth in the number of students entering postsecondary education. In 1869, a mere 63,000 students (one percent of all 18 to 24 year-olds in America) were enrolled in 563 postsecondary institutions, an average of only 112 per institution. By 1900, the average number of students enrolled in a typical college had more than doubled to 243 within 30 years. The growth in college enrollments was due to the corresponding rapid growth of the overall population in America (NCES, 1993, p. 64). However, the overall rate of college attendance was still quite low. Since only approximately two percent of 18 to 24 year-olds enrolled at a postsecondary institution, many significant barriers still existed: high tuition costs, unofficial segregation and discriminatory practices, gender and racial stereotyping, financial need to directly enter the work force, lack of parental encouragement and support to attend college, and a lack of role models who had attended or completed a postsecondary degree..

Impact of Federal Legislation

The First Morrill Act (1862) established the land-grant colleges. This was the first significant financial involvement of the federal government with postsecondary education. A primary focus for these institutions was on an applied education such as agriculture and the mechanical arts. This emphasis on the "industrial class" of American society was significant since it expanded the focus of postsecondary education outside the desires of the elitists who often sought to create and maintain power through exclusion in the educational process. Postsecondary education began to present a wider array of occupational preparation programs that had broad appeal to the growing middle class in America. These new public institutions provided options not offered by the already established denominational private institutions. States began to establish agricultural and mechanical (A&M) universities. This was a considerable broadening of the curriculum and a corresponding increase in access for students of more modest academic preparation and diverse socio-economic backgrounds.

While the doors of the colleges were opened much wider due to the 1862 Morrill Act, the academic preparation level of the potential students was uneven. Many of these new college students did not attend public high school since few were in operation, especially as one moved from the east coast to the expanding west. This dramatic widening of access to postsecondary education accelerated the development of academic bridge programs such as college academic preparatory departments. As described earlier, these academic preparatory academies were essential to provide practical hope for success of the newly admitted students from academically underprepared backgrounds. For example, ". . . Iowa State College required that entering freshman be fourteen years old and able to read, write, and do arithmetic. If they lacked these skills, they were placed in the college's preparatory department" (Maxwell, 1997, p. 11).

The need for academic preparatory departments was so great due to the underprepared nature of students that 84 percent of the land grant institutions provided some form of remedial education by 1889 (Craig, 1997). With the sudden emergence of these new land grant institutions with more open admission policies, competition became fierce to attract students who could help pay the institutional operational costs and faculty salaries. Since public high schools were not widespread across America, many new public and private colleges admitted students with only an elementary school education (Ross, 1942, pp. 113-115). There was a considerable struggle with the already established denominational colleges for the limited number of students who showed some interest in postsecondary education. Though the public institutions were established through funds provided by the First Morrill Act, the ongoing operating costs needed to be funded through taxes on the population and through student fees. Such taxes were unpopular among many in the New West since they had few financial resources themselves.

The Second Morrill Act (1890) extended the intent of the 1862 Act by broadening the curriculum, denying funding where there was racial discrimination, and providing annual financial disbursements as compared with a single appropriation through the first Morrill Act. These events increased the democratization of postsecondary education (Casazza & Silverman, 1996). However, the 1890 Morrill Act did not significantly integrate higher education since it permitted "separate but equal" minority colleges for the students whom were generally excluded from the predominantly White institutions based on Jim Crow laws from the mid 1800s and validated by Plessy v. Ferguson (1896). Most financial resources were allocated to the predominantly White institutions and not to institutions primarily serving females and students of color.

Rise of New Postsecondary Institutions

Besides annual financial support from the Second Morrill Act, African-Americans established their own colleges in the same pattern as women who sought to establish a parallel postsecondary system as an alternative to the preexisting Caucasian male dominated college establishment. Historically African-Americans had been excluded from the entire education system in America. An unanticipated consequence of the Civil War was the official recognition of some legal rights by African-Americans. Military historians note that the participation of Black soldiers resulted in them being officially treated equally with their White counterparts. While this official recognition was not generally matched with a corresponding reality, this was an important first step in recognition of legal rights, including opportunity for further education. While a "separate but equal" policy would follow, at least, limited financial support would be provided. This separate education experience for Black students encouraged many to pursue postsecondary education at HBCU institutions.

In the 1850s the percent of people of color who were enrolled in elementary and secondary was approximately two percent in comparison to nearly 60 percent for White students. By the 1880s the percent of students of color enrolled in school increased to approximately 35 percent while the rate for White students remained nearly unchanged at 60 percent (NCES, 1993, p. 6).

The American Missionary Society established several colleges to educate the newly freed slaves (Brubacher & Rudy 1976, pp. 74-76). Considering the twin deficits of nearly nonexistent secondary education and the negative emotional impact of slavery upon most African-Americans in America, the accomplishments by the Historic Black Colleges and Universities are remarkable. Remedial education was an important and valued core element of these institutions as they became the primary producers of educated minority college graduates (Boylan & White, 1987). To this day, they continue to be the location of choice for students of color to successfully complete professional and graduate school degrees.

Junior colleges (later to be called community colleges) were established as an important extension of the new secondary school movement developing in the U.S. during the turn of the twentieth century. While the first free standing community college was the Joliet Junior College in 1902 (Henderson, 1960, p. 13), President Harper of the University of Chicago in 1892 created the idea of the junior college within the University of Chicago (Griffith, 1976). The traditional four-year undergraduate program was divided in half, the first two years were the "Academic College" and the final two years were designated as "University College." These two names would eventually change to "Junior College" and "Senior College" (Eells, 1931).

Harper became dissatisfied with the initial experiment and encouraged the superintendent of the local Joliet public school system to extend Joliet High School for two additional years and designate the additional years of education as "Junior College." The junior college became an extension of the high school and commonly occupied the same building as the lower grades. For many students, attendance at the junior college would serve as their terminal education experience with them directly entering the world-of-work. The 6-4-4 plan was popular with such integrated school systems: elementary school composed the first six grades; middle school comprised grades seven through ten (which correlated with the age that students could leave school and enter the work force or marry); and for those who wished to pursue additional education the system provided grades eleven through thirteen. Twenty schools existed in 1907 and would expand to 1,250 less than 100 years later (Cohen & Brawer, 1996, pp. 12-15).

The junior-community college movement grew as a partial result of the increased strength of the high school curriculum and improved articulation agreements between secondary and postsecondary institutions. A distinguishing feature of the community college movement was the power given to communities to create such institutions through local referendums rather than waiting for establishment by state legislative bodies. By the mid-1950s the President's Commission on Higher Education stated that "virtually 50 percent of the population has the ability to complete fourteen years of schooling, that is, through junior college and that nearly one-third has the ability to complete a college course in liberal arts or professional training" (Butts & Cremin, 1953, p. 523).

Among the broad mission of many community colleges was a college academic preparatory program. This focus on serving academically underprepared students led Vaughan (1983, p. 9) to describe them as "the Ellis Island of higher education." Many four-year institutions were eager to transfer their academic preparatory programs to community colleges in geographic proximity to them in the early half of the twentieth century. As described earlier, the use of standardized college admissions tests made it easier for colleges to sort students based on test scores to different types of institutions who maintained varying levels of admission selectivity. As four-year institutions began to receive more state and federal appropriations, there was a lessening need to admit the high numbers of academically underprepared students needed to help pay tuition to meet institutional expenses (Richardson, Martens, & Fisk, 1981). Some notable exceptions of four-year institutions transferring preparatory programs out were the University of Buffalo and the University of Minnesota. Both institutions were required by state legislatures to accept all high school graduates with an official graduation diploma (California Postsecondary Education Commission, 1983; Maxwell, 1979). However, college academic preparatory programs dropped in number at four-year institutions as a direct result of less academically prepared students enrolling in the new junior colleges that excelled in providing a more comprehensive suite of academic support activities and remedial courses. A concurrent reason for enrollment at community colleges was that the lower tuition costs were more attractive to the developmental education students who often came from economically disadvantaged backgrounds. Federal financial aid and scholarship programs were not in existence at this time.

The increased participation of school-aged children in secondary education led to increased articulation between those high schools and the growing number of postsecondary institutions that admitted students of less academic preparation due to the high demand by those students to extend their education. The American public-school system grew rapidly at this time, between 1870 and 1900 the number of public high schools grew from 1,026 to 6,005 with an increase of students from 72,158 to 519,251 (U.S. Commissioner of Education, 1901). The National Education Association appointed the Committee of Ten in 1892 to study the issue of secondary school curriculum and the entrance requirements of postsecondary institutions. The leaders of the Committee, many of whom were well-known college presidents, advocated that some postsecondary courses be taught in high school:

> When college professors endeavor to teach chemistry, physics, botany . . . to persons of eighteen or twenty years of age, they discover that in most instances new habits of observing, reflecting, and recording have to be painfully acquired by the students -- habits which they should have acquired in early childhood. (National Education Association of the United States, 1893/1969, p. 10)

While the number of postsecondary institutions was rapidly increasing in the early 1900s, so were the methods for segregating students due to their scores on standardized college entrance examinations, gender, and ethnicity. The College Entrance Examination Board (CEEB) was founded in 1890. An important tool for sorting potential college students was created by the CEEB called the College Entrance Examination which permitted colleges to use standardized test scores as criteria for entrance decisions to postsecondary institutions. Some believed that the introduction of scientific instruments would help ensure that meritocracy would win over heritage, economic, and political influence when making college entrance decisions:

> It was believed that the school would be more objective about selecting people for their economic and social places through the use of scientific instruments for selection. Therefore, the science of education, particularly measurement, was considered the key to the efficient use of human resources. (Spring, 1986, p. 217)

Another goal of the CEEB was to standardized entrance criteria for postsecondary institutions nationwide as well as set exit criteria for high school students. It was hoped that secondary school administrators would use the examination as a diagnostic tool to increase the rigor of the high school curriculum and provide justification to college administrators to raise academic standards at the postsecondary institutions. These changes therefore might lead to the reduced need to provide remedial classes at the collegiate level (Boylan, 1988).

By 1879, 50 percent of the applicants to Harvard failed the institution's entrance examination and were then admitted "on condition." Tutorial programs which were initially designed to help students pass the college entrance test were now expanded to assist these provisionally admitted students to successfully complete their college courses (Weidner, 1990, p. 4). The Harvard Reports of 1892, 1895, and 1897 documented the poor academic preparation of incoming students. Part of the surprise to the university administrators was that the students who were suffering academic difficulty were not just those from poor or nonexistent high school education, but also the "picked boys" (Goodwin, 1895, p. 292), students who were from the upper class of American society (Hill, 1885). Academic rigor at Harvard exceeded the academic preparation level even of many students who had formal preparation for postsecondary education. This surprisingly placed many of these elite students into the developmental education category.

Various reasons were postulated for the poor academic preparation of the newly admitted college students. The Committee on English Composition and Rhetoric at Harvard complained about the ". . . inefficiency of most pupils, and the deplorable neglect of most schools, in the matter of English composition" (Committee, 1892, p. 388). W. P. Garrison led the 1892 Harvard Report authors. Their report found that "Unhappy instructors were confronted with immature thoughts set down in a crabbed and slovenly hand, miserably expressed and wretchedly spelled" (Garrison, 1892, pp. 299-300). Jennings (1896) was not surprised with the poor skill of the collegiate preparatory instructors since they lacked sufficient academic preparation themselves and that they were poorly compensated. Garrison (1892) cited the over emphasis on oral teaching methods, infrequent practice of writing skills, and lack of time spent with mastery of difficult reading material as significant factors reducing the effectiveness of preparatory schools. The academic preparatory schools blamed the grammar and primary schools for failing to give students sufficient basic skill instruction. Harrison (1895) blamed the parents for failing to set proper models of learning for their children at home. Brewer blamed the parents, newspapers, and others:

> The home, the very cheap newspaper, [and] the street, have furnished them with their common speech . . . under various circumstances from their infancy, without any vacation, and for a good many hours a day . . . no other perversion of talent has done so much to vulgarize our speech. (Brewer, 1896, p. 327)

Curtis (1896), a Massachusetts superintendent, blamed the colleges for failing to have consistent college entrance requirements and testing procedures which would therefore set an exit standard for students from public secondary education. This pattern of blame shifting among parents, public school officials, and college administrators would persist as a reoccurring theme for the next hundred years in American education as each of the stake holders tried to explain the continuing problem of student academic failure during college despite the best intentioned efforts by many to address successfully the issue.

Introduction of Remedial Classes to the College Curriculum

By 1874 Harvard established the first American college freshman remedial English course in response to faculty complaints that too many students lacked competency for formal writing activities. As described earlier, the introduction of remedial courses into the formerly fixed curriculum was possible due to permitting student choice of elective courses. Without that flexibility, remedial courses would have only been available as a precollegiate option. Academic conditions had not improved at Harvard, Yale, Princeton, and Columbia by 1907 with still half the students failing to earn the minimum composite entrance exam score that now consisted of the College Entrance Examination. It appears that faculty expectation levels at these highly selective institutions continued to rise more quickly than the academic preparation levels of these students from affluent and privileged backgrounds. In response to this gulf between expectation by the faculty and the performance level of the incoming students, Harvard began to offer a remedial reading course at this time. (Brubacher & Rudy, 1976, p. 244; Levine, 1996).

One stated goal of the CEEB was to eliminate the need for college preparatory programs since high schools were now expected to produce more academically prepared students. This goal, however, was unrealized. Much like today, many more students sought postsecondary education than those who enrolled in a college preparatory program during secondary school. Of those who enrolled in such a program of study, not all successfully mastered the academic course material though they might have received a high school diploma. Tutorial programs were supplemented with remedial classes during the first year of college to prepare students for the college-level curriculum. Yale, Princeton, and Columbia also added developmental courses to their curriculum for similar reasons (Wyatt, 1992).

While a variety of remedial courses were offered by individual institutions, the most common ones focused on remedial reading and study skills. More than 350 colleges in 1909 offered "How to Study" classes for academically underprepared students. The U.S. Commissioner for Education reported that in 1913 approximately 80 percent of postsecondary institutions offered college preparatory programs that offered a wide range of tutoring, remedial classes, and other forms of service (Maxwell, 1979), nearly the same percent as the middle of the 19th century. Unfortunately, there are few records that document research studies that analyzed these programs regarding their efficacy for improving student outcomes regarding higher grades and increased rates of college graduation.

Supporting the quickly growing field of remedial education classes, a hundred study skill books had been published by 1920 (Casazza & Silverman, 1996, p. 20). While most focused on secondary and postsecondary students, the first one that focused on college students exclusively was "Effective Study Procedures in Junior Colleges and Lower Division Courses" by Von Kleinsmid and Touton (1929). McMurry (1909) produced an illustrative textbook during this era entitled "How to Study and Teaching How to Study." McMurry was Professor of Elementary Education in Teachers College, Columbia University. Critical factors identified by McMurry for improving reading comprehension included: reading with a purpose; create questions that the reader would like to have answered before beginning to read; maintain a specific focus on the content material; create personal interest in the material to be read; reorganize material into understandable organizational patterns; summarize the reading material; critically evaluate statements; and memorize important ideas. "The study of a subject has not reached its end until the guiding purpose has been accomplished and the knowledge has been so assimilated that it has been used in a normal way and has become experience" (McMurry, 1909, p. 283). McMurry goes on to state, ". . . in order that young people may learn how to study, place the center of gravity of the school where it belongs -- in the learner" (1909, p. 296). McMurry's book foreshadows some of the future recommendations for improved learning by today's cognitive psychologists. The focus on the learner rather than only on the academic content material predates the current discussion on the changing educational paradigm of the shift from a focus on teaching by the faculty to the focus on learning by the students.

Sensitive to perceptions by students, professors, and others, many colleges gradually began to redefine the manner in which they presented remedial activities. When Perry, Director of Harvard's Bureau of Study Counsel, changed the institution's "Remedial Reading" course to "The Reading Class," enrollment significantly increased from 30 to 400 annually in 1938 (Wyatt, 1992). The content of this course had been adjusted to focus more on study strategies and less on the mechanical elements of reading. Perry's research suggested that high competency with isolated reading skills such as controlled eye movements and vocabulary word recognition did not always correlate with the ability to comprehend long reading assignments (Perry, 1959, p. 199). To control the number of students who wished to enroll in the course, Perry developed a placement test. While the students could do well with multiple choice questions, Perry reported that an astonishing 99 percent of the entering freshmen students were unable to write a short sentence that summarized content from a history chapter. In 1985 Harvard would move to mandatory enrollment in a remedial writing course based on the college placement assessment scores. After initial rejection of the course by many students, administrators followed the historical lesson from the reading course of a half century before by renaming it to something more acceptable by the potential consumer. Student enrollment increased dramatically when the name of the course was changed from "Basic Writing" to "Introduction to Expository Writing" (Armstrong, 1988). This strategy of course renaming is now becoming more popular and some institutions are attempting to cloak their remedial education classes by giving them names that will not draw attention of external reviewers or public officials who concurrently expect high college graduation rates without the use of remedial education classes by students who indicate a need for such enrollment. A few institutions have gone as far as renumbering the remedial classes to higher numbers to disguise their identity by mixing them in with other traditional first year college courses that count toward fulfilling general education graduation degree requirements.

To further document the growing trend of remedial classes, a national survey in 1929 revealed that about one-fourth of survey respondents stated that their institution provided some sort of reading admission examination and nearly an equal percent said that remedial courses were provided for students to remediate their deficiency. Most remedial courses were focused heavily on developing reading skills. Nearly 90 percent of respondents stated that they had not conducted research studies regarding the effectiveness of their programs (Parr, 1930).

While some institutions focused on enrolling newly admitted college students in remedial courses, other institutions required students to participate in precollegiate activities just before the beginning of classes. These summer academic bridge programs would become popular as a short-term remedy for admission of academically underprepared students. The University of Buffalo began such a program in 1926. Based on academic assessments, students who scored in the lowest 40 percent from urban high schools and the lowest 60 percent from rural high schools were required to enroll in a three-week study skill course conducted before classes began. Topics in these programs included English composition, reading, library skills, lecture note taking, and the basic concepts in the social and physical sciences. After another assessment was administered at the end of the short course, students received one of three designations: high scoring students entered the university without restriction; mid-range scoring students were admitted, but given a reduced academic load to reduce the academic pressure; and the lowest scoring students were not allowed to enter the university. Research studies suggested that the three-week class made a minor contribution to improving academic achievement and graduation rates (Eckert & Jones, 1935).

Remedial reading classes at this time were the most common prescription for students with indicators of academic risk. Ohio State University was typical of universities implementing such a program of remedial classes. Students who scored on standardized college entrance examinations in the bottom quartile of the entering freshman class were required to attend a weekly reading course. The seven-week course focused on the mechanics of reading (i.e., eye movement, vocalization, phrase reading using a tachistoscope). Participating students earned a semester grade point average that was one-quarter of a grade higher than nonparticipants (Pressey & Pressey, 1930). Tomlinson (1989, p. 3) characterized the 1930s as an era for great improvement regarding diagnosis of reading deficiencies and the development of college reading clinics. Use of the tachistoscope was viewed as a significant tool for the improvement of reading skills, therefore hopefully leading to improved comprehension gains with textbook readings and assigned text materials from the classroom. Education theorists assumed that improvement in the physical process of reading would lead to significant gains of comprehension (Robinson, 1933).

Book (1927a) reported on the effectiveness of "learning to study" classes offered at Indiana University. These courses were primarily focused on improving basic reading skills. The researcher postulated that 90 percent of knowledge learned during college was obtained through books and reading technical articles. Low scores on college entrance tests placed students into the learning skills course. Research studies suggested improvement with time management and reading skill (Book, 1927b). Book emphasized the importance of using course textbook and lecture material as the object for study skills that were taught and practiced. This immediate application of study and reading skills with classroom material would not become common until after the 1960s. Charters (1941) conducted a national survey that found while reading courses were offered at most institutions, they still focused on attempts to improve the mechanical aspects of reading (controlled eye movement, increased eye span, increased reading rate) and on isolated study skill instruction (Charters, 1941). Metacognitive learning strategies would not be widely taught in study skill courses until the 1980s and later.

Many Historic Black Colleges and Universities of the South provided a wide range of precollegiate academic development activities to help compensate for the lack of quality secondary education beginning in the late 1800s and early 1900s. While most of these institutions were established through private funds, some received direct financial support such as Howard University in the District of Columbia. Howard would become the premier HBCU in the nation (Prieto, 1997). The Southern Teaching Program, Inc., in the early 1900s involved students from the Yale Law School who worked with students at thirteen Black colleges during the summertime. These colleges started the same suite of academic enrichment programs that would become popular at predominately white colleges in the 1960s: special courses, intensified sections of regular college courses, tutoring, clinical work, and a reduced academic load (McGrath, 1965).

Within many institutions separate schools were created for students interested in academic majors centered on science, agriculture, and engineering to separate them from the liberal arts students whom some perceived to be of higher status. Even some of the elite institutions such as Harvard University created separate degrees and certificates for the less prepared students (Eliot, 1969). The creation of these separate academic units within the institution provided a home for the growing collection of remedial classes that they commonly offered in reading, English, mathematics, and study skills. The residual effects of this administrative decision can be seen today by observing the number of institutions that maintain separate academic units for teaching remedial and developmental courses. This has sometimes led to the marginilization of developmental educators who were viewed as ancillary to the academic mainstream of the institution.

While some strides were made in increasing access to postsecondary education for Caucasian males, the situation for students of color and women was only marginally improving. The policy of 'separate but equal' was the predominate policy for college education in the South for Blacks. While many HBCU institutions such as Tuskegee and Howard were founded at this time, there was little significant access for students of color at predominately White institutions in the South. These residual effects of poor academic preparation, few role models of successful students at the high school or college level, historic racism as well as a lack of financial assistance effectively sealed shut the door of most predominately Caucasian institutions to a more diverse study body. On the other hand, some well-intentioned White advocates for Black students in northern institutions tried to enroll them in a rigorous liberal arts curriculum without adequate academic preparation. This was similar to the experience of some Native Americans students in the period following the American Revolutionary War. The results were nearly as disastrous with poor academic performance and few college graduates (Brubacher & Rudy, 1976). While tutoring programs were provided for White students to enable them to pass the college entrance exams and the rigorous courses experienced during the first year of college, such services were not generally extended to the new student subpopulations that sought admission to the institutions. Discriminatory practices -- both formal and informal -- would commonly deny service to females and students of color until the 1960s. It would take nearly another one hundred years before educational leaders would learn that academic access to college must be combined with a comprehensive approach of providing appropriate services for academically and economically disadvantaged students. The Civil Rights legislation of the 1960s would create federally-financed programs to bundle academic access, financial aid, and academic development.

Cultural stereotypes and gender discrimination limited most females to seeking postsecondary education from single gender women's colleges. These colleges first began to appear in the 1830s. It was feared by some elitists that the college experience would raise women above the duties of her "station" in life, at least the one that the traditional male-dominated aristocracy often prescribed. Proponents of this position believed that a man would not love a learned wife and it would be better to teach women to be:

> Correct in their manners, respectable in their families, and agreeable in society . . . They were such delicate creatures, so different in mental as well as physical make-up from men, that they would never be able to survive the prolonged intellectual effort. (Brubacher & Rudy, 1976, p. 65)

Due to limited opportunities for attendance at secondary schools and the inferior level of many single gender college preparatory schools for females, many women's colleges were forced to focus their curriculum at a much lower level than postsecondary institutions with predominate male populations. A few women's colleges succeeded in delivering high quality college education: Vasser, Wellesley, Smith, and Bryn Mawr. But even these institutions, much like Harvard at its inception, found a compelling need to provide a college academic preparatory program due to the woeful condition of secondary education programs (Boylan & White, 1987). While women were allowed to earn academic degrees, these institutions had an underlying motivation to have these female students frequently serve in other menial capacities such as working in the laundry and provide cleaning services for the male students at nearby male or coed colleges (Maxwell, 1997, p. 11).

Summer sessions devoted to remedial courses became commonly offered on many college campuses to help reduce the time taken to complete college degrees (Van, 1992b). This was the next logical step building upon the practice of offering short workshops preceding the beginning of college courses in the Fall. It was critical during the World War II for colleges to quickly produce college graduates to serve as officers. One of the most popular reading techniques, SQ3R, was developed by Frank Robinson from Ohio State University to help military personnel study their textbooks more quickly and effectively during the condensed, eight-week college courses offered during the summer semesters. After the war, SQ3R would enjoy near unanimous use by study skill and reading classes for the following generation (Maxwell, 1997, p. 13).

As this phase of developmental education came to a close, World War II had an unanticipated impact upon developmental education. The need to produce college graduates who could immediately provide leadership as officers encouraged institutions to increase their speed and effectiveness in producing college graduates with highly effective learning and critical thinking abilities needed.

This third phase of developmental education was marked by the rapid expansion of a heterogeneous student body that required intensive academic development programs. Precollegiate academic preparatory academies were insufficient to meet the needs presented by this expanded student body. It was necessary to introduce remedial courses into the college curriculum to attempt a redress of their inadequate academic skills and knowledge.

Phase Four: Remedial Classes Evolve into Comprehensive Programs, Late 1940s through Early 1970s

Federal involvement intensified during this time regarding both finances and legislative oversight. Significant events were the GI Bill, civil rights expansion, and equal opportunity legislation. College enrollment increased significantly during the 1950s since the high school to college enrollment rate rose from 15 to 24 percent of 18- to 24-year -olds. During the 1960s the rate increased to approximately 35 percent and finally reached 45 percent in the next decade. Much of this growth was due to a significant increase in enrollment by adult and part-time students (NCES, 1993, p. 66). Higher education was viewed as essential for many young people and returning veterans from World War II to join the growing middle class in America. Rather than the traditional focus on a liberal arts education, many of the new students perceived the purpose of postsecondary education as preparation for direct entry into the world-of-work.

Impact of World War II

The Servicemen's Readjustment Act of 1944 (GI Bill of Rights) inspired and financially supported nearly one million World War II veterans to enroll in college by the fall of 1946 (Wyatt, 1992). The Act provided for up to 48 months of financial support for postsecondary education. Nearly five million veterans applied for the educational benefits with more than 2.5 million veterans attending college in the subsequent decade. These veterans represented a wide and diverse socio-economic group of individuals who through the sheer force and magnitude of enrollment within the education system made a profound impact upon the college environment (Prieto, 1997).

The enrollment of this diversified student body would help to accelerate changes that were already occurring within higher education:

> . . . the GI Bill was clearly effective in bringing the children of working-class families into the middle class educational mainstream. This was the thin end of a democratizing wedge prying open higher education in the United States. Never before had so many people in any society earned so many higher degrees. (Appleby, Hunt, & Jacob, 1994, p. 147)

Part of the change in higher education was the response by colleges to provide student services for older students who often faced the twin concurrent challenges of lacking the college bound secondary school curriculum and experiencing the years of interruption from their last formal schooling because of service during the war. These students often brought multiple needs that commonly required academic support and enrichment. Many college preparatory programs of the early 1900s were expanded to deal with the significant increase in college students after World War II. A national survey by Barbe (1951) suggested that the years after WWII witnessed the growth of a significant number of reading clinics to meet the high number of academically underprepared students who were entering college. While there was general agreement for the need of such clinics, the administrative placement and implementation of services lacked any common plan across the U.S.

Introduction of Counseling Services

It was common practice in the 1950s to emphasize counseling services as a major component of remedial programs (Kulik & Kulik, 1991, p. 36). Klingelhofer (1954) described the services provided at the State University of Iowa for academically high-risk students. The Iowa experience typified experiences and policies of other institutions of higher education. Students who had been placed on academic probation were required to attend mandatory counseling sessions. Students completed self-assessment instruments concerning academic adjustment, time schedule, and occupational preference. The counselor and student would then discuss the responses and develop an action plan. The limited research models of this time suggested that participating students earned a higher semester grade point average than students who did not participate. However, research methodologies were limited and failed to have the sophistication to deal with variables that are more typically of research studies today.

Impact of Civil Rights Federal Legislation

The Civil Rights movement in the early 1960s would be manifested in various ways as it began to make societal changes in the infrastructure of America at both the state and national level. The Civil Rights Act of 1964 and other programs of President Lyndon Johnson's Great Society focused on both people of color, whom had been historically excluded from many of society's benefits, as well as poor people who were of diverse ethnic backgrounds:

> The War on Poverty encompassed three major areas of concern: unemployed and delinquent youth; disadvantaged students for whom education did not provide equality of opportunity; and the cycle, or circle, or poverty. (Spring, 1986, pp. 302-304)

A major event during this period was the reversal of the previous sanctioned policy of "separate but equal" education introduced by Plessy v. Ferguson (1896). Brown v. Board of Education (1955) provided an opportunity to reverse this policy. Chief Justice Earl Warren stated on behalf of the unanimous finding of the U.S. Supreme Court:

> Segregation of white and colored children in public schools has detrimental effect upon colored children. The impact is greater when it has the sanction of law; for the policy of segregating the races is usually interpreted as denoting the

> inferiority of the Negro group. A sense of inferiority affects the motivation of the child to learn . . . . (Brown v. Board of Education, 347 U.S. 483, 494)

Warren continued in the opinion by stating on behalf of the Court, ":We conclude that in the field of public education the doctrine of 'separate but equal' has no place. Separate educational facilities are inherently unequal" (Brown v. Board of Education, 347 U.S. 483, 495). This court case, and the other related ones, would serve as important foundation for later civil rights legislation of the 1960s. It would require the power and authority of the Civil Rights Act of 1964 to eliminate the dual education in postsecondary education. A natural result was increased promotion of opportunity and success in education at all levels. A need accompanied the new access to higher education to provide meaningful academic support programs to increase the academic success of these newly admitted students (Howe in Thompson, 1988). Access without the ongoing support mechanisms was an empty promise of hope to students from academically and economically disadvantaged backgrounds. Most of these students faced postsecondary education as first-generation college students with few role models or even students of similar ethnicity among either the student body or the teaching faculty. This affective dimension of student academic success would not be recognized by most educators until the 1990s.

It was necessary to create education intervention programs to deal with deep-rooted social problems that influenced many students of color and those from low socio-economic backgrounds in America:

> . . . an interlocking cycle of poor education leading to poor or no jobs, which leads to living in poor areas, which means an inferior education for one's children. This self-replicating, intertwined cycle affects virtually every index of African-American well-being, further separating, spatially and socially, both black from white, and those still in the ghetto from those who have worked themselves out of it. In varying degrees, matters of race, or race-based class, and of class independent of race determine black status in America. (Sitkoff, 1993, pp. 224-225)

Among its provisions, the Economic Opportunity Act of 1964 created a new federally-supported program called "Upward Bound." Initial modest financial support provided funds for 18 pilot programs during that year across the United States. This new program focused on first-generation and economically-disadvantaged secondary school students by providing academic enrichment activities, career counseling, cultural enrichment activities, and setting of high expectations for college graduation. Upward Bound was the first of what would be termed "TRIO Programs." The term refers to the original "trio" of programs (Upward Bound, Talent Search, and Student Support Services) funded by the federal government to encourage access and success of previously disenfranchised students with completion of high school and graduation from college. The Talent Search program was authorized as part of the 1965 Higher Education Act and the Student Support Services program was added in 1968. The amended Higher Education Act added another TRIO program called Educational Opportunity Centers which focused on service to displaced or underemployed workers. In 1986, the Ronald E. McNair Post-baccalaureate Achievement Program was added (Jacobs, 2000). While TRIO programs do not generally regard themselves as compensatory education programs, they do use many activities commonly associated with these programs: academic tutoring, intrusive academic advising, study skill workshops, academic preparatory classes, and mentoring. TRIO leaders have been careful to align themselves more closely with Civil Rights legislation that has had more political clout than developmental education which has often been ignored by national policy makers, though it has been an integral part of American higher education since the 1600s.

The Higher Education Act (HEA) of 1965 was designed to widen access and support for students who had been traditionally excluded from postsecondary education for a variety of reasons: institutional racism against students of color, low economic background, first-generation to pursue postsecondary education, limited ability to speak English, and students with a disability. The previous program that provided support was the Economic Opportunity Act with its Poverty Program. These initial access programs were then transferred to Department of Health, Education, and Welfare (HEW).

The HEA expanded access to higher education that was expressed in three major programs: establishing TRIO Programs for first-generation and economically-disadvantaged students, funding for "developing institutions" to establish learning assistance programs (USDOE Title III Strengthening Institutions Grant Program), and introduction of need-based financial aid for economically-disadvantaged students (Pell and Perkins Grant Programs). These programs provided encouragement for the largest infusion of underprepared and economically-disadvantaged students since the early 1900s. The Act ". . . represents the charter that Congress defined for the nation, expressing the national purpose that higher education should be accessible to all qualified persons regardless not only of the traditional 'race, creed or national origin,' but also of economic status." The federal appropriations since the inception of the Act have grown by more than 400 percent, rising from $31 million to more than $13 billion in 1998 (Prieto, 1997, p. 3). The federal financial aid from the Act enabled more than one half million students (15 percent of all enrolled students) living at or below the poverty line to attend college. While the new access programs allowed these students to attend college, it also placed expectations upon the colleges to develop academic support programs to support the academic success and graduation of these new students.

Another consequence of the HEA was the democratization of higher education by recognizing the importance of community colleges, vocational schools, and technical schools. The term "Postsecondary Education" was first used in the Act to recognize these institutions as equal with the more prevalent and older four-year colleges and universities (Thompson, 1988). During the 1960s, approximately one community college was established weekly in the U.S. Many of these institutions would be prominent providers of developmental education courses and learning assistance centers. They were also more affordable for these students who were often from economically-disadvantaged backgrounds. With the increasing diversity of institutional types being created at this time, it became popular for state legislators and state-level education policy makers to advocate for differentiation of academic mission for these institutions.

Often two-year institutions were viewed as the primary providers of remedial and developmental education for less academically prepared students.

Open Door Admissions Policies

When community colleges began to expand in the early portion of the twentieth century, the entry level test scores for their students were only moderately lower than senior institutions (Koos, 1924). This dramatically changed in the 1960s as open door admissions policies of community colleges brought many students to postsecondary education who formerly entered the work force immediately after high school. An illustrative case study of the impact of the new open admissions policies is what occurred at the City University of New York (CUNY). Beginning in 1970, the ten senior colleges and eight two-year colleges of CUNY were required to accept for admission all students who graduated from the city's high schools, despite their previous levels of academic achievement and class rank. The CUNY system faced a variety of problems because of this administrative decision: the faculty was unprepared for the number of underprepared students; class sizes became unmanageable due to the sudden increase in students; and there were insufficient academic support programs (i.e., tutoring) or remedial courses to meet the need (Maxwell, 1997, pp. 14-15). The issue of open admissions at the CUNY institutions continued to be controversial during the following three decades. The New York Board of Regents in 1999 voted to limit severely or eliminate remedial education at CUNY's eleven senior colleges by 2001. William Crain, a psychology professor at City College, called the vote "an enormous civil-rights setback" since most of those affected by the change were students of color who were often first-generation college attendees commonly challenged by academic underpreparation and economic disadvantages. Crain charged that the policy violated Title VI of the Civil Rights Act of 1964 since programs that receive federal funds cannot discriminate because of race (Hebel, 1999, p. A33). Litigation continues as attempts are made to overturn the decision.

Increased pressure was placed on community colleges in the 1970s and 1980s as four-year institutions began to recruit more heavily potential college students to replace the higher numbers formerly provided from the post war baby boom. Senior institutions recruited the more academically able students and left community colleges with more academically-unprepared students. This, therefore, dramatically increased the need for comprehensive learning centers and developmental education courses to serve these students at the junior college level. This also left a false perception that there was a lack of students with academic need at the senior institutions. Actually the opposite probably occurred as faculty expectation levels continued to increase with the assumption that the average student body was more academically able to master difficult course material. An example of this occurred in the late 1990s at one of the California State University campuses. After college admission standards were increased, an unanticipated occurrence was that more students were placed into developmental mathematics courses than before the academic standards were adjusted. The mathematics department had increased the rigor of its internal departmental math placement examination administered to students the first day that they attended class. The faculty's expectation level had risen more quickly than the reality of the students' ability level in math.

Challenges for Remedial Education

While remedial programs were pervasive in postsecondary education, especially among community colleges, Roueche (1968) found little evidence of their effectiveness. "[I]ntuition rather than research appears to be the basis for most remedial programs" (p. 42). Roueche continued:

> There is a paucity of research on the efficacy of remedial programs in the junior college. Indeed, with few exceptions, community colleges neither describe nor evaluate their endeavors in this critical area. Available research will not support the contention that junior colleges offer programs that in fact remedy student deficiencies. Programs are certainly offered, but the entire issue of remedying deficiencies has not been sufficiently researched to date. (p. 47).

Roueche makes the obvious observation when he said, "Can a community college remedial course rightfully expect to accomplish in one or two semesters what public schools have failed to accomplish in 12 years?" (pp. 47-48). While Roueche has been a long-term supporter of using effective developmental education programs to increase student success, he strongly advocates a comprehensive institution-wide approach to improving academic success of students.

Several meta-analysis studies of remedial and developmental education programs were conducted in the ensuing two decades. Kulik, Kulik, and Schwalb (1983) examined 300 studies and found that there was a positive correlation between participation in the program and increased final course grades and reenrollment at the institution. A confounding variable noted in the research studies is that students who enroll in developmental courses are less academically prepared than most of students who do not enroll. When comparing these two groups, it is not surprising to find that the developmental education students have lower rates of academic achievement or graduation rates than the nonparticipants (National Center for Educational Statistics, 1991). Past research studies have often not had access to key preentry student attributes (specific high school grades, standardardized test scores, affective domain measures) and did not employ sophisticated statistical analyses that are available today. Both are critical to effective research to study relationships between independent and dependent variables.

The introduction of new subpopulations of nontraditional academically underprepared students added to the already large number of traditionally-aged underprepared ones. Many college academic preparatory services responded to this new situation by becoming more comprehensive as a result (Boylan, 1988). In the late 1970s, nearly 80 percent of all postsecondary institutions provided some academic enrichment and support program (Roueche & Snow, 1977). This was nearly the same percent as was reported in 1889. However, the services provided by these programs were more comprehensive, extensive, and coordinated that services offered earlier. It appears that the high rate of academic support services is a natural response to academic needs expressed by many college students.

There was a growing expectation by many in American society that everyone should have an opportunity to attend postsecondary education. A major issue was how "to make good on the implied promise of the open door" (Gleazer, 1970, p. 48). In 1973, the Carnegie Commission observed how postsecondary education in the 1960s moved from providing "mass higher education" to offering "universal access." This was an important change in the purpose of high education:

> The current transition to universal access to college involves the guarantee of a place for every high school student who wishes to enter higher education, the introduction of more remedial work, the adaptation to the interests of new groups of students regardless of age. . . . It is a transformation of fundamental, historic proportions. (Carnegie Foundation for the Advancement of Teaching, 1973, p. 5)

The difficulty was that while the open access policies that resulted from the Civil Rights legislation from the 1960s provided an open door for students that were more diverse and often less academically prepared, the situation turned into a "revolving door" (Roueche, 1968). While institutions might report the heterogenous nature of their entering college class, most did not want to admit that most college graduates did not reflect the same diversity but instead were predominantly White. Roueche argued that admitting severely academically underprepared students without a corresponding college remedial program was an injustice to the individual student and also to society as a whole which expected their publicly supported institutions to effectively educate all students, not just those who were academically talented before entry to postsecondary education. Roueche stated that colleges had to operate differently than the secondary schools who produced them:

> As a result of this open-door policy, many students entered college with academic deficiencies. After a lifetime of gathering credits rather than learning basic skills, they were unprepared for the more stringent demands of college courses. (Rouche & Baker, 1987, p. 34)

The "right to fail" was a predominant theme of many colleges that permitted students to pursue academic degrees for which they had little academic preparation. Open access and self advisement without the corresponding level of academic support services served to foster an environment of neglect that encouraged a decision by many students to drop out of college. "Community colleges have long been caught between a rock and a hard place -- trying to provide access and opportunity to all who can profit, while maintaining academic standards in the face of increased student underpreparedness" (Roueche & Roueche, 1993, p. 1).

Another barrier facing the students entering through the new open door is related to the egalitarian nature of higher education at many institutions. While Jacksonian Democracy emphasized the merit of the individual (meritocracy) over parentage (aristocracy), this perspective would limit student enrollment in college a century later until a new paradigm was introduced. The "Entitlement" paradigm stated that regardless of merit or parentage, students had a right to attend postsecondary education and expect financial assistance to permit them to reasonably select the institution of their choice. Students of low socio-economic backgrounds generally do not have the opportunities for academic preparation as students of higher levels. When students are required to pass college entrance examinations and complicated admissions procedures, some students fail to pass through the door (Cross, 1971, p. 120). Coleman (1966, p. 20) talked about how these entrance exams were "culture-bound" and reflect the values and knowledge of the dominant ethnic group in the U.S. Many would argue that the use of scientific methods to assess and place students were actually cloaked tools to perpetuate racial and economic class discrimination against students traditionally underrepresented in higher education.

Cross (1971, p. xii) described another wave of students entering postsecondary education during the 1960s. Cross called them the "New Students" for lack of another more descriptive name. During this time these students shared many following characteristics: bottom third of their high school class regarding their graduation percentile rank; first-generation college students; passive learning styles; overestimation of their academic abilities to handle college-level material; diverse age, socioeconomic status, and ethnicity. Between 1972 and 1982, students over the age of twenty-five increased their college enrollment by more than 70 percent (King, 1985). Because of the increasing nature of lifelong learning and a decline in the traditional aged college students, the "new" adult students of the 1960s have changed in comparison to their peers in the early post WWII era. They are more heterogeneous regarding most demographic measures, more likely to have a strong career and goal focus, and perform at academic levels that meet or exceed those by the 18 to 22-year-old students (Richardson & King, 1998). These students tend to access learning assistance services in high rates as they do with other campus services such as career counseling and academic advising.

Students with disabilities received federal mandates to accommodate their needs by education providers. While the federal legislation was initially applied to elementary and secondary education, it has been extended to postsecondary education as well. The Rehabilitation Act of 1973 and the comprehensive 1990 Americans with Disabilities Act charged postsecondary institutions with providing "reasonable accommodations." Common services provided by some included one or more of the following based upon the unique needs of each student with a disability: additional time to complete examinations, tutors, note takers, counselors, equipment to audio record lectures, and other adaptive equipment. Such interventions were reported to help these students meet or exceed the graduation rates of students without a disability. For example, at Adelphi University, the students with a disability who participated in a comprehensive program of academic support graduated at a rate of 84 percent as compared with a rate of 60 percent for students without a disability (Yanok & Broderick, 1988).

Almost half of first-time community college students in the late 1960s and 1970s were underprepared for college-level courses and advised to enroll in one or more developmental education courses (Roueche & Roueche, 1999, p. 5; McCabe & Day, 1998). A challenge for the college-bound students is that while they may have enrolled in college preparatory courses, they may be the wrong ones to prepare them for freshman year graduation-credit courses (Horn, Chen, & MPR Associates, 1998). Academic advisement errors that resulted in misplacement of students was often due to the imprecise utility of academic assessment instruments and the interpretation of the results. There was an over reliance upon the scientific certainty of the instruments for accurate placement of students. Most authorities agreed that about half of the variables associated with academic success could be measured through standardized examination results. The other half were accounted through affective domain factors such as goal orientation, motivation, and related factors.

This frustration with the inability to always accurately predict student success created great frustration for all stake holders involved in the academic enterprise:

> The open door often turned into a revolving door, with students dropping out and 'stopping out' regularly. This led to a highly charged debate about the lowering of standards, often followed by the call to raise admission standards and close the doors of opportunity to the thousands of prospective new students. (Casazza & Silverman, 1996, p. 28)

Some education leaders advocated that the curriculum could accommodate students who were academically underprepared by requiring their mandatory participation in comprehensive developmental education programs consisting of a carefully coordinated program of support and enrichment (Cross, 1971; McCabe, 1983; Roueche, 1978). Students who enrolled in developmental education classes after being advised to do so based on standardized college entrance tests had graduation rates nine times higher than students who ignored the advice and enrolled in college-level courses instead (Rouche & Baker, 1987).

Reading courses have been the predominant form of academic assistance in postsecondary education until the middle of the twentieth century (Abell, 1894; Leedy, 1958; Lowe 1966; Stahl, Hynd, & Henk, 1986). Robinson (1941) and Triggs (1942) were the first researchers to articulate what is generally accepted as the beginning of the modern day educational theories for learning strategies. Pauk, a few years later, wrote the benchmark book for the field of learning strategies, How to Study in College (Kerstiens, 1998). Pauk based his book on experiments as director of the Reading Study Center at Cornell University. These Cornell researchers changed the focus on reading speed and efficiency to a more comprehensive program that identified different types of learning strategies employed with the academic content material.

The fourth phase of developmental education was characterized by the embedding of remedial courses within the traditional college curriculum and an expansion of services that also addressed the affective domain. The addition of counseling services would open an entire range of new affective domain services for developmental education in the ensuing years. This was a turbulent phase during which many historically underrepresented students were brought into postsecondary education. This period witnessed mass experimentation with old and new developmental education activities to meet the needs of a very heterogenous student body. While many new students entered postsecondary education, it also witnessed a mass exodus of students who were unable to persist at the institution due to their limited academic preparation and the nature of developmental education services then.

Phase Five: The Profession Matures and Becomes More Comprehensive, 1970s to 1990s

Developmental Education

The predominant term of choice of many within the profession beginning in the 1970s has been "developmental education," borrowed from the field of college student personnel. Developmental education is more comprehensive regarding the student and focuses on development of the person through both the academic and social domains (Casazza & Silverman, 1996). Rather than focusing on the students' deficits, developmental education assumes that each student has talents that can be developed beyond dealing with improving the weak skill areas. Developmental education assumes that all students are "developmental" and can grow in multiple dimensions of their academic skills. "The notion of developmental sequence is the kingpin of developmental theory . . . A goal of education is to stimulate the individual to move to the next stage in the sequence" (Cross, 1976, p. 158). There are many similarities among the goals of developmental education and those of lifelong learning.

The National Association for Developmental Education (NADE), largest of the professional associations representing faculty and staff in the discipline created the following definition. This definition was more comprehensive regarding purpose and encompassed of the entire student body:

> Developmental education is a field of practice and research with a theoretical foundation in developmental psychology and learning theory. It promotes the cognitive and affective growth of all learners, at all levels of the learning continuum. It is sensitive and responsive to the individual differences and special needs among learners. (NADE, 1996)

Others continued to find it helpful to differentiate between terms used to describe the field. Rather than using the terms interchangeably, Cross expressed the differences between remedial and developmental education in the following way:

> If the purpose of the program is to overcome academic deficiencies, I would term the program remedial, in the standard dictionary sense in which remediation is concerned with correcting weaknesses. If, however, the purpose of the program is to develop the diverse talents of students, whether academic or not, I would term the program developmental. Its mission is to give attention to the fullest possible development of talent and to develop strengths as well as to correct weaknesses. (Cross, 1976, p. 31)

Learning Assistance

In the early 1970s a new version of academic support was the introduction of the Learning Assistance Center (Carman, 1970; Christ, 1971; Ellison, 1973; Gunselman, 1971). Many in the developmental education field credit Professor Frank Christ at California State University-Long Beach for developing the first Learning Assistance Center (then called the Learning Assistance Support System) and being the first to use the term in the professional literature. White and Schnuth (1990, p. 157) noted that a distinguishing characteristic of LAC's is their comprehensive nature and mission within the institution. Rather than focusing on a subpopulation of underprepared students, LAC's extended their services for all students and faculty members. The center was seen as a natural extension of the classroom with enrichment activities for all students, not just those with a history of academic underperformance.

Christ (1971) stated that these centers had six purposes: higher course grades for participating students; central location for students to receive tutorial assistance; referral source to other helping agencies; comprehensive library of basic study aids; training agency for paraprofessionals, peer counselors and tutors; and a center for faculty development. This last feature of serving as a venue for faculty development is unique in comparison with previous remedial and developmental education programs:

> A Learning Assistance Center will be any place where learners, learner data, and learning facilitators are interwoven into a sequential, cybernetic, individualized, people-oriented system to service all students (learners) and faculty (learning facilitators) of any institution for whom LEARNING by its students is important. (Christ, 1971, p. 39)

LAC's, according to Christ, were much more comprehensive in terms of theoretical underpinnings and the services that they provided in comparison with earlier reading labs and other forms of academic assistance:

> [LAC's] differed significantly from previous academic support services by introducing concepts and strategies from human development, the psychology of learning, educational technology, and corporate management into an operational rationale specific to higher education; by functioning as a campus-wide support system in a centralized operational facility; by vigorously opposing any stigma that it was 'remedial' and only for inadequately prepared, provisionally admitted, or probationary students; and by emphasizing 'management by objectives' and a cybernetic subsystem of ongoing evaluation to elicit and use feedback from users for constant program modification. (Christ, 1997, pp. 1-2)

Learning centers, and later Supplemental Instruction, benefitted from this focus on avoiding the remedial label for its services. Community colleges during this time warmly embraced remedial education since they viewed it as a primary mission for the institution as well as a source of state financial support. Legislative leaders sought to differentiate institutional missions among types of higher education colleges and universities. It was difficult for public four-year institutions to receive state appropriations to fund expansive remedial courses. However, learning enrichment services offered to all students at four-year institutions were politically acceptable to most state-level policy makers.

According to Christ, the LAC provided a new venue for students to pursue personal and academic development:

> a place concerned with learning environment within and without, functioning primarily to enable students to learn more in less time with greater ease and confidence; offering tutorial help, study aids in the content areas and referrals to other helping agencies, and programs. (Christ, 1971, p. 35)

Various factors encouraged the rapid development of these centers among postsecondary institutions: application of technology for individualized learning; response to lowered admission standards; focus on cognitive learning strategies; use as a program to increase student retention; and providing a learning enrichment atmosphere for all students, regardless of the previous level of academic performance (Enright, 1975). The LAC was viewed as a catalyst for improved learning across the campus. Rather than continuing the previous practice of preparatory programs and remedial courses that were often outside the heart of the college, these centers were central to the institutional mission (Hultgren, 1970; Kerstiens, 1972). Faculty members often recognize these centers as extensions of the classroom and for deeper mastery of the college-level content material. "The resource center does not define the goals of the learning it supports; it accepts the goals of the faculty and the students" (Henderson, Melloni, & Sherman, 1971, p. 5). It was common for LAC's to be a consolidated and centralized operation that was housed in a single location on campus. White, Kyzar, and Lane

(1990, p. 185-189) reviewed the common space requirements for LAC's. Because of the variety of services provided by the centers, extensive space was necessary to house tutorial areas, classrooms, computer labs, staff offices, curriculum materials, and other spaces.

Lissner (1990, pp. 132-133) states that LAC's were the natural evolution of the various student support programs that were created after the Civil Rights legislation of the 1960s. Integration of various components was required to bring together instructional media centers, writing centers, reading laboratories, study skill centers, and individual audio tape tutorial centers. Many of these activities were supported by grants awarded during the previous decade, therefore, it was necessary for the colleges to institutionalize or eliminate the components. Coherence was brought to the various activities through a common philosophy.

A major departure of the mission of the LAC's was to embrace the enrichment and development of all students on campus, not just the smaller number who were the least academically prepared that needed remedial assistance. Individual student interventions and course-related services are both provided.

Growth of Professional Associations and Graduate Degree Programs

It is a natural phenomena for academic disciplines to create a system to educate, validate, and support those involved with the enterprise. These systems often include professional associations, publications, and graduate degree programs. These are especially important to provide identity and validation for its members. Such a system is especially important if its members are under perceived attack by other rivals (e.g., other academic disciplines, campus administrators, state legislators) or from the general public who either do not understand or value the members.

Nearly all academic disciplines had already established long-standing professional associations, publications, and major graduate degree programs that produced future leaders for the profession. In relative terms, developmental education developed its system much later than other academic disciplines. Various explanations are offered for its late development. Many faculty members perceived their primary allegiance to academic content areas (e.g., English, mathematics) and affiliated with the corresponding professional association (e.g., National Council of Teachers of English, American Mathematical Association). This was especially true for full-time faculty members who may have only taught one remedial course while the rest of their assignment was devoted to college-level courses and research interests.

Another reason was that others affiliated with large international organizations who primarily focused on primary and secondary education students such as the International Reading Association. Eventually college educators sought affinity groups that focused on college students instead. A third possible explanation for the late development of developmental professional associations was due to the highly transitory nature of employment of developmental education. Many such educators are employed part-time and move on to other responsibilities and do not perceive of the field as one of long-term involvement and commitment.

Several national professional associations related to learning assistance, developmental education, and advocacy for students from first-generation, academically- and economically-disadvantaged backgrounds were founded after the 1950s. The first professional association that focused on remedial and developmental education at the college level was the Southwest Reading Conference in 1952. Its first president was Oscar Causey. Later the association would be renamed the National Reading Conference.

The College Reading and Learning Association (initially the Western College Reading Association, then the Western College Reading and Learning Association) was started in 1966. The initial informal meeting included a small group of about 20 professionals. Gene Kersteins was appointed the first president. The young association was incorporated in New Mexico in 1972. In 1978 the association changed its name to the Western College Reading and Learning Association to encourage membership by fellow developmental educators in writing, learning assistance, tutorial programs, mathematics, and other related areas. The association changed its name in 1989 to the College Reading and Learning Association to recognize the growing national membership in the organization. CRLA publishes a quarterly newsletter, annual conference proceedings and the biannual Journal of Reading and Learning (Kersteins, 1998).

Following the passage of national legislation creating the federal TRIO programs for first-generation and economically-disadvantaged students, political advocacy was clearly essential to expand financial support for these programs. In 1972 Walter Mason organized the first regional association for the professionals employed by the TRIO grants called the Southwest Association of Student Assistance Programs. Within five more years, an additional eight regional associations were created to advocate for increased federal aid for TRIO and to provide professional development to its members. In 1978 the National Council of Educational Opportunity Associations (NCEOA) was created by Mr. Clark Chipman and Dr. Arnold Mitchem to coordinate efforts of the regional associations in influencing national policy. Dr. Mitchem has served as the chief executive officer of the association and chief lobbyist since its early days. In 1981, the association changed its name to the National Council of Educational Opportunity Associations and again in 1998 to the Council on Opportunity in Education (COE). Research suggests that TRIO program activities are related to contributing to graduation of two million TRIO students from college (Jacobs, 2000).

The National Association for Developmental Education (initially the National Association for Remedial/Developmental Studies in Postsecondary Education) was founded in 1976 following a small meeting held in Chicago to discuss common interests in the growing profession. Both "remedial" and "developmental" was included in the association's name since it was unclear then which term would become the more commonly used in the professional literature. Gary Saretsky served as president and Harry Hild served as vice president from 1976 until 1982. NADE's first local chapter in New York City in 1979 and South Carolina became the first state chapter. In 1981

NADE contracted with the National Center for Developmental Education to provide the Journal of Developmental Education as a membership benefit and official journal of the association. NARDSPE changed its name to NADE in 1984. The association began the 1980s with a membership of 400 and ended the decade with more than 2,000 members (Boylan, 1997).

A variety of other professional associations have also arisen in the past quarter century. The National College Learning Center Association focuses on providing professional development to learning center directors. The National Tutoring Association serves educators from higher education, secondary education, and private individuals interested in improving the practice of tutoring.

Interviews with leaders of several of these professional associations suggest common challenges. The first is that most faculty and staff involved with developmental education are not members of any of these professional associations. The most frequent teacher of a developmental education course is either a part-time adjunct faculty member or a faculty member who only teaches one such course with the rest of their academic load devoted to teaching college-level courses. It is estimated that more than 30,000 such members are in this category. These faculty members do not associate with the developmental association either due to the cost factor, inability to have time or budget to attend chapter or national meetings, or are members of academic content associations such as the National Council of Teachers of English, American Mathematical Association, or similar professional societies.

A second challenge for the developmental organizations is that there is considerable overlap of membership among them. Unlike most education fields where there is one predominant society, developmental education has multiple national associations with similar purposes and overlapping geographic service areas. As a result, many are members of multiple associations to receive the professional publications provided by them. This leads to a division of the available pool of people who wish to provide leadership and volunteer for service.

A third challenge for these professional associations is the reliance upon short-term elected officials and groups of overworked volunteers who provide service. None employ full-time staff members to provide day-to-day management of essential association activities and services. They remarkably provide the high level of service under the current system of volunteer labor.

The final challenge for the professional associations is the general discomfort with members regarding political advocacy on the local, state, and national level. The use of a mainly volunteer work force coupled with the quick change over of national leadership due to limited terms of office presents great difficulty for providing a consistent and forceful presence with state and national policy makers to advocate for issues related to developmental education.

Several other national organizations, graduate education programs, and publications have been important with service to the developmental education community. The National Center for Developmental Education (originally called the

Center for Developmental Education) was established in 1976 through a three-year grant of $663,226 from the Kellogg Foundation secured by the work of Chancellor Herbert Wey of Appalachian State University in Boone, North Carolina (Spann, 1996). Dr. Milton "Bunk" Spann was hired from the University of Texas to serve as founding director until 1988 when Dr. Hunter Boylan assumed those duties. The idea for the Center was the result of Chancellor Wey's plan to form a developmental studies consortium with the colleges of the Western North Carolina Consortium (WNCC). The Center's mission is "to provide resources for educators who work with underprepared adults in college and university settings . . . to improve the quality of practice in the field of developmental education through technical services, instruction and training activities, publications, and research. . . " (NCDE, 1994).

The Journal of Developmental Education (initially named the Journal of Developmental and Remedial Education) was first published in 1978. This was the first academic publication in the field of developmental education. Spann has served continuously as editor since its founding and May Garland served as the first managing editor. Review of Research in Developmental Education (edited by Dr. Boylan) is another publication created in 1983 that focuses on publishing current research in the field. The Center has hosted since 1980 the Kellogg Institute for the Training and Certification of Developmental Educators. The first director of the Institute was Dr. Hunter Boylan (Miller, 1996, pp. 47-48). Since its inception, more than 800 professionals from all 50 states and several countries have been credentialed through its month-long summer residency program with follow-up research studies for participants after they return to their home campuses. Additional information dissemination systems of the Center include a research library, a matching service with hundreds of resource persons

During this period a variety of formal and informal systems for professional development were established. The nation's first graduate programs in developmental education (M.A. and Ed.S.) were begun at Appalachian State University in 1972. Grambling State University (LA) in 1986 started the nation's first doctoral program (Ed.D.) Other developmental education graduate degree programs exist at National Louis University (Chicago, IL) and Southwest Texas State University (San Marcos, TX). The University of Missouri-Kansas City approved the Learning Systems Management program in 1999 with recruitment efforts underway for the first class to be admitted in 2001.

National Research on Effectiveness

In the mid 1980s several national surveys found similar results concerning the academic preparation level of students. Roueche, Baker, and Roueche (1984, p. I) found that between 30 and 40 percent of entering students read below a seventh grade reading level. The researchers believed that this reading proficiency rate would remain unchanged for the succeeding two decades. A national survey of 1,297 postsecondary institutions by Lederman, Ribaudo, and Ryzewic (1985) stated that 85 percent of four-year faculty and 90 percent of two-year colleagues believed that first-year students were underprepared for college course work.

Meta analyses of developmental education programs have sought to identify factors associated with successful outcomes (i.e., higher student academic achievement, higher rates of reenrollment and graduation rates). A national survey by Noel, Levitz, and Kaufmann (1982) identified administrative support and stable funding; adequate facilities; student assessment; supportive environment for adult learners; and a competent and skilled developmental education staff and faculty as necessary factors. The University of Texas (1984) conducted a national survey to correlate common factors related to developmental education student success. The following eleven factors were noted in the study: strong administrative support; mandatory counseling and placement; structured courses which monitored student progress; developmental courses awarded at least institutional credit; permit more time to complete degree; multiple learning systems (i.e., independent study, computer-based instruction); faculty volunteer to teach developmental students; availability of peer tutors; monitoring of student behaviors; articulation between exit competencies of developmental courses and the corresponding prerequisites of first-year college courses; and strong developmental education program evaluation (Roueche, Baker, & Roueche, 1984). Van (1992a) conducted an extensive review of the professional literature that confirmed the aforementioned findings with the identification of an additional finding, focusing on development of the student affective domain (i.e., positive self concept, an internal locus of control).

The most extensive research study conducted was by the National Center for Developmental Education and funded by the Exxon Education Foundation (Boylan & Bonham, 1992). The study involved a carefully selected group of 150 institutions of various types. Detailed information was collected on students who entered college during Fall 1984 and followed them through Spring 1990. There were positive relationships of developmental education students for higher college grade point averages, higher pass rates of students who pass first college-level courses in same subject as developmental education course, and higher graduation rates. Students who were placed into developmental education courses and completed them tended to have the same rates of academic achievement as students who were not placed into developmental courses due to higher predictors of future academic success.

The National Center for Education Statistics (1991) found in their national survey of American postsecondary institutions the following findings during 1989. Ninety-eight percent of all institutions offered at least one academic support service such as peer tutoring (offered by 85 percent of all institutions), counseling (82 percent), or learning centers (69 percent) for students which was an increase from about 90 percent in 1983. Three-fourths of all colleges offered at least one developmental course regardless of the ethnic makeup of the institution. The percent of colleges offering these courses was highest with public colleges (91 percent) and lowest with private colleges (58 percent). About one-third of all college freshmen took one or more developmental courses and about 60 percent of institutions required students to enroll in developmental courses if they scored low on college admission examinations. The percent of students enrolling in these courses was highest at institutions with a predominantly minority student body (55 percent) and lowest with nonminority (27 percent). Students were more likely to pass developmental courses at private institutions (80 percent) than at public institutions (65 percent). Additionally, about 20 percent of institutions awarded graduation credit for developmental courses. It was estimated that 30,650 people taught developmental courses. Further, it is estimated that two million of the twelve million enrolled in postsecondary education participate in one or more developmental education activities each year (Boylan, 1999).

Using data from the national survey in 1989 (NCES, 1991) to serve as a comparison point for comprehensive studies before and after this study, it is possible to make the following observations about postsecondary institutions across the United States regarding developmental education. The percent of institutions offering developmental education courses has decreased from approximately 85 percent in 1976 (Rouche & Snow, 1976) to 82 percent in 1982 (NCES, 1985), 74 percent in 1989, and 78 percent in 1995 (NCES, 1996a; NCES, 1991). When the 1995 national data is broken down by different institutional types, 100 percent of community colleges and 94 percent of institutions with high rates of minority student enrollment offer developmental courses (NCES, 1996a). The rate of about 30 percent of entering students enrolling in developmental courses was stable between 1985 and 1995. Of the 2,128,000 first-time students in Fall 1995, 445,220 of them enrolled in one or more developmental courses

(NCES 1996a; NCES 1991). The percent of institutions that provide some type of academic support services increased from 90 to 98 percent between 1982 and 1989 (NCES, 1985; NCES, 1991). This seems to suggest that while some of the options for providing developmental education may have been curtailed, the level of academic support services had increased to nearly universal provision at American colleges of all types. The percent of institutions of that required students to enroll in developmental courses if they scored low on entrance examinations increased from approximately 27 percent in 1976 (Roueche & Snow, 1977) to 60 percent in 1989 (NCES, 1991) and finally 75 percent in 1995 (NCES, 1996a). The number of educators teaching developmental education courses increased from 26,000 in 1985 to 30,650 in 1989 (College Marketing Associates, 1985). There was a significant decrease from 48 percent in 1976 to 20 percent in 1989 and finally a reduction to 15 percent in 1995 for providing graduation credit in developmental courses (Rouche & Snow, 1977; NCES, 1996a; NCES, 1991). Boylan (1985) found that while institutions may have stopped the awarding of graduation credit for developmental courses, they continued to award institutional credit to increase college revenues. About three-quarters of institutions offered institutional credit for these courses (NCES, 1996a).

A persistent frustration by some members of the public and policy makers is the continuing need for developmental education and learning assistance programs in postsecondary education. With the raising of academic standards at most American high schools, these groups are frustrated with the continuing needs of these programs. The continuing need is caused through an unanticipated related variable, the increasing percent of students who attend college. While only about half of high school students enroll in college-preparatory courses, nearly three-fourths attend college (Boylan, 1999; NCES, 1996b).

An important issue regarding developmental education has been its cost. Phipps (1998) estimates that less than one percent, $1 billion of $115 billion in public higher education budget, is spent on developmental education and learning assistance programs. Additional analysis by Phipps found that the unit cost of developmental education courses were less than other academic content areas such as English, math, or business. This was surprising since most developmental education courses have class sizes much smaller than most core academic subjects. This may be due to lower mean salaries paid to developmental education faculty members in comparison to faculty members who teach graduation credit courses.

Others state the need for developmental education through the costs to society and the economy through lost contributions by college dropouts. Wilson and Justiz (1988, pp. 9-10) state that the United States risks the development of "... an educational and economic underclass whose contributions to society will be limited and whose dependency on others will grow. We also risk creating a culture and economy that ignores the talents of a large number of citizens." Cardo, Tsang, and Robinson (1998) voice their concern that the newly admitted students with learning disabilities will be ignored by post secondary institutions and will fail to complete their educational objectives.

Creation of Supplemental Instruction

Supplemental Instruction (SI) was created at the University of Missouri-Kansas City (UMKC) in 1973 as a response to a need at the institution created by a dramatic change in the demographics of the student body and a sudden rise in student attrition. UMKC was formerly the University of Kansas City (UKC), a small, private university. While UKC was located in an urban area, its private status only permitted well-prepared students for admission. In the early 1960s UKC fell upon hard financial times and made itself available for purchase by the State of Missouri. After the University of Missouri system purchased UKC in 1963, there was a dramatic change in the student body. Besides reducing the selectivity of the student body, the institution quickly acquired independent professional schools of law, dentistry, pharmacy, and a conservatory of music. While the undergraduate student body had lowered levels of previous academic achievement, the same faculty who had high academic expectations for students from the UKC era continued to teach at the new UMKC. Attrition at the institution quickly increased from 20 to 45 percent (Widmar, 1994).

Rather than choosing the course taken by many institutions during the early 1970s to offer developmental classes or provide a centralized learning assistance center, UMKC chose another course. Well before the current trends in some areas of the country that prohibited developmental education courses at public four year institutions, the University of Missouri system had already prohibited such courses in the 1970s. Another means of providing learning assistance and developmental education for students was required.

Gary E. Widmar, Chief Student Affairs Officer, hired a then doctoral student in reading education -- Deanna C. Martin -- to work on a $7,000 grant from a local foundation to develop a response to attrition among minority students in medicine, pharmacy, and dentistry. Martin used her knowledge from her recent graduate studies along with a national survey of learning center directors to identify common concerns with traditional approaches to helping students: services were ancillary to the institution; standardized tests were insufficient to predict students that needed assistance; services were often provided too late for help to students; students did not have time nor money to enroll in additional developmental courses; students displayed difficulty in transferring study strategies to the academic content courses; individual tutoring was expensive; students often did not avail themselves of services for fear of being stigmatized; and evaluation of learning services was inadequate (Widmar, 1994, pp. 4-5).

Martin successfully pilot tested what would be eventually named Supplemental Instruction in 1973 during an Anatomy class at the UMKC School of Dentistry. Additional grant support was gained and SI was used successfully in a variety of courses in several health science professional schools. The SI program was then implemented at the undergraduate level after its success with the rigorous courses in the professional schools (Martin, et. al, 1983).

In 1981 the SI program was certified by the U.S. Department of Education as an Exemplary Educational Program. It was the first research-based educational program certified by USDOE as contributing to increased student academic achievement and persistence toward graduation. SI was one of the first programs to conceive of mainstreaming developmental education. It was the first to systematically measure the long-term results of SI participation through longitudinal studies in postsecondary education.

Federal funds were provided through the National Diffusion Network under USDOE's Officer of Educational Research and Improvement to support national dissemination of the SI model to other campuses. To date, faculty and staff from more than 860 institutions in the United States and an additional 165 institutions in 12 countries have attended SI Supervisor training workshops conducted by staff from the Center for Supplemental Instruction located at UMKC. It is estimated that more than a quarter million students participate in SI during each academic term. Approximately 450 professional publications and other forms of media have been written about SI by staff from the SI Center at UMKC and other SI administrators and scholars from around the world (Arendale, 1999).

Phase five of developmental education was a period of rapid change with the delivery of academic assistance for students. Developmental education became more varied in its approaches of providing services. Examples of this were the creation of Learning Assistance Centers and of Supplemental Instruction. Professional development and leadership was afforded by the growth of professional associations, organizations, and graduate degree programs.

Phase Six: Expansion of Developmental Education for All Students, 1990s to Present

Astin (1998, p. 11) stated that the excellence of a higher education institution is often defined primarily by resources and reputation. One major resource is the enrollment of students who have the highest high school cumulative grade point averages, the highest test scores on standardized college entrance examinations, and the strongest recommendations from prominent people. Astin states:

> It goes without saying that the underprepared student is a kind of pariah in American higher education, and some of the reasons are obvious: since most of us believe that the excellence of our departments and of our institutions depends on enrolling the very best-prepared students that we can, to admit underprepared students would pose a real threat to our excellence. These educators value being smart much more than . . . developing smartness. (Astin 1998, p. 12)

Other educators are beginning to engage in a debate with Astin and others about the basic purpose of postsecondary education. As Astin has stated, is American higher education in the talent identification business, or the talent development enterprise? If the former, then college admission policies will continue to discourage developmental education students from enrolling at average to high prestige institutions. If the later, then all institutions should warmly embrace their developmental education departments since they are essential partners in helping to educate students.

Some educational leaders proclaim a new emphasis is taking root in higher education (Lazerson, Wagener, & Shumanis, 2000). They expose the time-honored myth that teaching and learning are two sides of the same coin. This new change in emphasis of the education model is reflected in several areas. The first area concerns the central focus of education. Rather than the traditional teacher-centered model, the focus according to these proponents is a shift to being learning-centered. Instead of the focusing on the broadcaster of information, it is now focused on the effectiveness of the transmission process. The traditional instructional model encourages an increase in the quantity of information that is presented to students and use of new instructional technologies to transmit it. After a long period of committing scarce resources to improving teaching, many educators are turning their attention to improving the efficiency and effectiveness of the learning environment. Rather than examining how much information was delivered, the question is how much does the student understand. As the focus of education shifts from the professor to the learner, many developmental educators are reinventing themselves as resources for the entire campus -- students and faculty alike -- in partnering with the new enriched learning environment.

An example of this change in attitude by some developmental educators is reflected in the following vision statement developed by the National Association for Developmental Education for its strategic plan, "By 2003, NADE will be a nationally recognized association of professionals with expertise to help students academically succeed throughout the entire educational experience from high school through college and graduate/professional school" (http://www.umkc.edu/cad/nade/). This statement creates an expanded operating statement for a field of education that has been traditionally narrow in focus and low in status. The professional literature in the field illustrates many examples where developmental educators are expanding their mission to support learning achievement by all students, not just those at the margins of academic success.

Once again, the issue of building college student enrollment through more effective student retention programs has increased the appeal of developmental education. Effective models of retention stress the need for students to be integrated into the academic and social dimensions of the college community (Tinto, 1993). These connections need to be established during the first weeks of their first year of college. This interpersonal support system is important for all first year students, despite their background and experience.

In addition to concern for students dropping out of the institution, there is the additional problem of students shifting out of college majors due to academic difficulty. There has been particular concern with student persistence in mathematics, science and engineering for all student subpopulations, particularly females and students of color. Some researchers have found a positive correlation between persistence in science major course work and involvement in study groups outside class for female students (Shlipak, 1988). Researchers suggest that increased student involvement is an important strategy to help stem the drop out rate for science and math students (Hilton & Lee, 1988).

Numerous developmental education centers have been transformed into full service learning and teaching centers. Rather than focusing exclusively with developmental students, these departments have changed their mission. This "value-added" mission expands service for all students, not just those at the institution's margins who have traditionally received additional help -- the developmental and the gifted students. In addition, some of these expanded centers also provide faculty development services as well. An overview of some of these centers is provided through the NADE home page (http://www.umkc.edu/cad/nade/nadedocs/lrnteacn.htm). Some of the common practices of these expanded centers include using academic support programs to provide requested feedback to course professors, publishing teaching effectiveness newsletters, conducting learning effectiveness workshops, providing teaching mentors, and consulting on instructional delivery innovation.

It is difficult to assess the impact of phase six of developmental education since it is still in progress and accurate historical analysis often requires distance from the contemporary events to give perspective and judgement. It appears that developmental education is adapting to the environment in which it operates. While the relationship between postsecondary education and developmental education has often been tumultuous, the best research-based educational practices are being mainstreamed within higher education and more warmly embraced by administrators and the academic community.

Summary

These six phases of the history of developmental education described in the previous review of the literature provide a historical context to place SI. The history of American higher education is intimately linked with developmental education and learning assistance. The historical record supports the following three statements: (1) developmental education is not some phenomena of the second half of the twentieth century, but has rather been an important component throughout the history of American higher education; (2) associating developmental education with a decline in academic standards is erroneous since often its purpose was to help raise the academic performance of participating students; and (3) developmental education is a contributing factor helping more students to earn higher grades and to complete college than similar students who did not participate with the activities and programs.

A potentially confusing research finding is that the rate of college drop out rates from four-year institutions has remained at 50 percent for the past 100 years (Tinto, 1993, p. 25). This finding has several potential explanations. The first is that the various developmental education strategies and academic assistance programs are ineffectual in improving the academic success of students. An alternative explanation of this phenomena is that less academically-prepared students and students from low socio-economic backgrounds have enrolled at increasingly higher rates over this time. While access to higher education has increased, the overall success rate of students has remained nearly the same. Some argue that this is a major achievement, but that efforts should continue to raise the level of academic achievement of all students (Gladieux & Swail, 2000). An additional explanation is that it is a faulty assumption to measure all academic success by the criteria of completion of a baccalaureate degree. The increased sophistication of technical and community colleges enables them to prepare students for immediate entry into well-paying jobs with certificate and two-year associate degrees.

The next section of this review of the literature is a detailed historical and theoretical overview of SI. This is the major subject for this dissertation study.

Overview of Supplemental Instruction (SI)

Many developmental educators possess knowledge and skills to improve the effectiveness and efficiency of the learning environment. One of the learning assistance programs that offers diverse opportunities of service to the campus in enriching the learning environment is Supplemental Instruction (Martin & others, 1977; Martin & Arendale, 1994). Supplemental Instruction (SI) is used by more than 800 campuses in the U.S. and twelve countries to provide an enriched learning environment for students to increase mastery and understanding of content material from historically difficult courses. There are more than 450 citations in the professional literature concerning the use of SI in the U.S. and abroad (Arendale, 1999). The SI program was created at the University of Missouri-Kansas City in 1973 by Dr. Deanna C. Martin. Extensive literature regarding SI can be found at a web side maintained by the National Center for Supplemental Instruction at UMKC: www.umkc.edu/cad/si/ The following narrative provides an overview to the way that most SI programs are implemented in the United States. While there may be some minor variations as the program is implemented outside the U.S., the same general principles guide SI programs.

SI Program Activities

SI is a student academic assistance program that increases academic performance and retention through its use of selected collaborative learning and study strategies. The SI program targets traditionally difficult academic courses, those that typically have 30 percent or higher rate of D or F final course grades and/or withdrawals (e.g., algebra, chemistry, anatomy). SI provides regularly scheduled, out-of-class, peer-facilitated sessions that offer students an opportunity to discuss and process course information (Martin & others, 1977).

SI sessions are extensions of the classroom where students continue the learning process initiated by the professor (Wilcox, 1995). Rather than being limited by the prescribed classroom time, students can attend SI sessions as often as they want throughout the academic term to receive the assistance that they need and to engage in intellectual inquiry. Students receive continuous feedback regarding their comprehension of the classroom material, thereby giving them opportunity to modify their study behaviors before major examinations are administered by the professor. Immediate feedback received during SI sessions enables students to quickly modify study behaviors to adapt to the academic rigor and requirements of the course. Many students are responsive to SI since they perceive that their need for academic assistance is met in the sessions (Martin, 1980). Professors participate in the SI program at the level that they choose. Some faculty members report significant professional development opportunities for themselves that are described later in this document.

Assistance begins in the first week of the term. The SI leader -- a former successful student of the same class -- introduces the program during the first class session and surveys the students to establish a schedule for the SI sessions. Attendance is voluntary. Students of varying abilities participate, and no effort is made to segregate students based on academic ability. Many underprepared students who might otherwise avoid seeking assistance will participate in SI since it is not perceived to be remediation and there is no potential stigma attached (Martin & Blanc, 1981). Such unintended stigmas can cause motivation problems for developmental students (Somers, 1988). SI is a cost-effective program both in comparison with one-on-one tutoring programs and increasing student persistence/graduation rates (Martin & Arendale, 1993).

Glendale Community College (Glendale, CA) reported good success with SI in calculus courses. Some student comments are illustrative of the benefits of the SI sessions:

> What I really liked about the SI was that if I had any questions, Dr. Kolpas or the other helpers didn't tell us the answer. Instead, they let us think about the problem, set it up, and solve it ourselves. I also liked the one-on-one help and the friends I made." "Having more opinions and minds to work a

> problem helped a lot. The groups discussed problems from many different points of view. (Allen, Kolpas, & Stathis, 1992, p. 9)

SI sessions provide a way to integrate "what to learn" with "how to learn." SI allows students to develop the needed learning strategies while they are currently enrolled in college degree credit courses. SI avoids the remedial stigma often attached to traditional academic assistance programs since it does not identify "high-risk students" but identifies "historically difficult classes." SI is open to all students in the targeted course; therefore, prescreening of students is unnecessary. Since the SI program begins the first week of the academic term, the program provides academic assistance during the critical initial six-week period of class before many students face their first major examination. Attrition is highest during this period (Noel et al., 1985).

SI focuses on historically difficult courses. Historically difficult courses often share the following characteristics: large amounts of weekly readings from both difficult textbooks and secondary library reference works, infrequent examinations that focus on higher cognitive levels of Bloom's taxonomy, voluntary and unrecorded class attendance, and large classes in which each student has little opportunity for interaction with the professor or the other students. Some researchers (Christie & Dinham, 1991) have concluded that it is difficult to rely solely upon the analysis of high school grades and standardized college entrance examination scores to accurately identify all students who will withdraw from college. Less than 25 percent of all students who drop out of college due so because the institution has academically dismissed them (Tinto, 1993). Many leave the institution due to extreme difficulty and frustration in high risk courses (Noel, et al, 1985).

Such a designation of historically difficult for a course makes no prejudicial comment about the professor or the students. It is a numerical calculation that suggests many students have difficulty in meeting academic requirements for the class. Rather than blaming the students or the professor, the designation suggests that additional academic support is needed for students to raise their level of academic performance to meet the level deemed appropriate by the classroom professor. In recent years, the popular and professional literature has been replete with extensive discussions about who is at fault for the perceived lower quality of student academic achievement. SI bypasses this issue and provides a practical solution that helps students meet or exceed the professor's level of expectation.

Key SI Program Personnel

There are key persons involved with SI on each campus -- the SI leaders, the SI supervisor, and the course instructors. Each plays an important role in creating the environment that allows the SI program to flourish.

The typical SI leader is a student who has successfully completed the targeted class or a comparable course. It is ideal if the student has taken the course from the same instructor for whom he or she is now providing SI assistance. The SI leader is trained in proactive learning and study strategies and operates as a "model student," attending all course lectures, taking notes, and reading all assigned materials. The SI leader generally conducts or facilitates three or more out-of-class SI sessions per week during which he or she integrates "how to learn" with "what to learn."

The SI leader is a facilitator, not a mini professor. The role of the leader is to provide structure to the study session, not relecture or introduce new material. The SI leader should be a "model student" who shows how successful students think about and process course content. He or she facilitates a process of collaborative learning, an important strategy since it helps students to empower themselves rather than remain dependent as they might in traditional tutoring (Martin, et. al, 1983). Research suggests that tutoring relationships do not always promote transfer of needed academic skills (Keimig, 1983).

A central responsibility of the SI leader is to integrate study skills with the course content. As someone who has performed well in the course, the SI leader has displayed mastery of the course material. However, it is important for the SI leader to share his/her learning strategies with the other students in the SI sessions. If the students only learn content material and not the underlying study strategies, they will have a high probability of experiencing academic difficulty in succeeding courses. The integration of study skills with the course content is a key difference between SI and other forms of collaborative learning. It is not just that students are working together.

It is the planned integration and practice of study strategies that sets SI apart. By combining “what to learn” with “how to learn it,” students can develop both content competency and transferable academic skills. SI sessions capitalize on the use of the "teachable moment" to apply and model learning strategies with the course material.

SI provides many opportunities to address study skills within the content of the course. Research has shown that teaching study skills in isolation from content has little impact on the students' academic performance (Dimon, 1988; Keimig, 1983; Stahl, Simpson, and Hayes, 1992). While students can be taught elaborate note-taking and text-reading strategies, these skills are not necessarily put to use in courses that they subsequently take. Also, it is likely that different classes will require different note-taking styles and a science text is used differently from a social science text. As SI leaders model appropriate questioning and reasoning, students begin to internalize aspects of thinking strategies that will carry over into their individual and group study.

A qualitative study from the United Kingdom (Ashwin, 1993) suggested the following benefits to SI leaders from their participation in the program: increased confidence, greater understanding of course material, increased interest by potential employers due to cocurricular nature of SI leader experience. Maloney (1992) reported the use of the SI leader experience as an alternative field experience for secondary education majors before student teaching.

The second SI program partner is the SI Supervisor. This college faculty or staff person has received formal training to serve as the supervisor to the SI program. Responsibilities for the SI supervisor include: selecting courses for support, hiring SI leaders, supervising SI leaders, and completing evaluation reports every academic term that SI is offered. An old adage goes, "you cannot expect what you do not inspect." Supervision of SI leaders during their SI sessions is critical. It is not enough to conduct an initial workshop before the term begins and then have a party at the end. SI leaders need helpful feedback from the SI Supervisor concerning the behaviors that occur during the SI sessions: appropriate modeling of study strategies, allowing students to help develop the session agenda, insuring that the SI leader does not talk too much, using effective collaborative learning strategies to encourage active learning, and other behaviors.

The third key person with the SI program is the faculty member. SI is only offered in connection with classes that have the full support of the classroom instructor. Instructors can choose their level of involvement with the SI program. At a minimum, the instructor makes an announcement at the beginning of the academic term endorsing the SI program and encouraging the participation of all students. Some instructors spend a few minutes each week with the SI leader reviewing SI session plans. Increasing levels of involvement could lead to the instructor helping the SI leader prepare mock practice exams or practice problems.

SI Adds Value to the Professor's Lecture and Assigned Readings.

SI adds value to the professor's lectures and assigned readings through the out-of-class, peer facilitated review sessions. Professors have an ever expanding knowledge base to consider as they deliver their lectures and make reading assignments. Since the number of class periods will not increase, strategies must be developed to help manage student study time outside class to help master the instructional content.

The SI leader can mentor the students in using strategies that the leader previously found helpful with the course material. This is why it is often critical in the American education system that the SI leader attends class with the students. The students need specific assistance with the day's reading material and lecture notes besides appropriate use of study skill strategies. SI activities can enhance both study skills and comprehension of the course content. It is generally not advisable to label these activities study skill instruction, but rather to weave skills into the context of the course material. SI leaders need to recognize the "teachable moment" and introduce or model the appropriate skills, tying them directly to the content review. Often these discussions last only a few minutes at most. Several examples of how this can be accomplished are noted here.

Processing lecture notes requires students to consider the adequacy of their own note-taking techniques. It quickly becomes evident to many of them that there may be a better method for recording what the professor said than the one they presently use.

SI leader suggestions might include use of summary margin notebook paper (which has a wide left margin), recopying notes that are particularly difficult to decipher, writing potential test questions that can be used for reviewing the material in their notes, correlating notes with outside reading assignments, and highlighting notes when appropriate. In addition to modeling strategies by the SI leader, others in the study group are encouraged to share their methods as well.

Students find that organizing and processing information during the SI session is a very beneficial experience. They see that course content is manageable and that with some work and mutual support, they can make sense out of even the most difficult material.

After each exam, the SI leader can guide the group in going over the questions that were particularly troublesome. This process reinforces the correct answers on the exam and gives the students a chance to examine how they interpreted the questions; how they derived the answers; and if they made an error, why they made it. Reviewing the test will also help students to understand more thoroughly the kinds of questions the professor asks and to predict future test question more accurately. This activity helps students to develop a perspective similar to the professor concerning the important things in the class. Sometimes the student who attempts to act as a stenographer and record every statement made in the course can have the same level of academic difficulty as those who take few notes. The ability to value and prioritize information is an important skill as well as the ability to quickly record notes of live lectures or from textbooks.

If the textbook includes graphs, charts or diagrams, it is important that the students do not omit these aids from their study of the materials. Occasionally, when graphs are used extensively, it is appropriate to review how to read and interpret graphs, as well as review the material they contain.

Text reading efficiency can be enhanced through a procedure called "reciprocal questioning" (Manzo, 1969; Martin & Blanc, 1981). In brief, a small section of the text is selected for silent reading. Then both the SI leader and the students take turns asking and answering questions. When students become active readers, as this procedure requires, they find that the time they must spend in re-reading material is greatly reduced because they comprehend more information during their initial reading.

At times during the term it will be helpful to direct the students' attention back to the course syllabus. From the syllabus students can anticipate the dates of future tests and the amount of material to be covered between tests. Some discussion can result that will include tips on time management.

Other Uses of SI

SI as a Follow-up to the First-Year Experience.

The SI program is uniquely suited to serve as a companion of a campus First Year Experience Program as follows: provides immediate application of learning strategies to content courses; encourages formation of learning communities composed of students who seek higher academic achievement; addresses common factors in student attrition; and meets or exceeds academic expectancy levels of historically difficult first year courses (Martin & Arendale, 1993). SI is an excellent follow up activity for students who have participated in first year experience programs. SI provides a supportive environment for the immediate application and use of study strategies that were discussed or demonstrated during First Year Experience programs.

A challenge for first year student programs that are conducted before the beginning of the academic term is that they often rely on lectures concerning study strategies. These instructional sessions are usually isolated from the actual content material in college courses. Students often feel frustrated when faced with abstract lectures concerning study skill instruction that is dissociated from college content material. Rather than seeing the need for such instruction, many students associate study skill strategy review as appropriate for "other students," those who need remedial or developmental assistance. Students perceive a vested interest in study skill strategies when the skills are directly applied to content courses that the students are currently taking. Faced with an impending exam, students are receptive when they might otherwise be uninterested.

Use of SI for Faculty Development and Renewal

In addition to helping students to increase their retention and understanding of course material, the SI program has been effectively used for faculty development and renewal. Faculty can choose to do one or more of the following: adopt strategies used in the SI sessions during regular class time; receive informal feedback from the SI sessions concerning what the students understand and need additional assistance with; and learn new strategies as they serve as mentors to the SI program student leaders. Additional benefits mentioned by Australian faculty members include: increased rapport with students, membership in national and international SI network, increased recognition from their colleagues, additional opportunities to obtain grant funds, and increased satisfaction with their teaching role (Gardiner, 1996).

Angelo (1994) identified several barriers to providing effective faculty development programs: most efforts focus primarily on improving teaching, and only secondarily, if at all, on improving learning; many programs do not recognize the importance of discipline-specific "ways of knowing," teaching, and learning; many teachers fail to recognize the need for development of their own teaching; and many faculty development programs are not planned and organized for success.

One of the strengths of the SI program is that faculty members select their level of involvement. Professors can select from the following three broad areas of participation. The first is to receive anonymous feedback from SI leaders regarding student comprehension. This gives them an opportunity to revisit previous lectures for review/clarification and to modify future lectures. It is difficult for students to reveal their ignorance or lack of understanding to a person who has placed great effort in delivering carefully crafted lectures. Students do not want to share that they do not understand the lecture with the person who also determines their final grades and whether they pass on to the next class or not. Use of the SI program as a feedback loop is frequently used in Australia, Republic of South Africa, and the United Kingdom.

The second level of involvement is to incorporate SI strategies into class period activities (Martin, Blanc, & Arendale, 1994). A faculty member may attend part of the SI leader training workshop to learn how to adopt these activities for in-class use. SI activities often used by SI leaders could be used by faculty members as well. For example, a faculty member might give the "big picture" of the course throughout the academic term; illustrate the "messy" process of solving problems and thinking about issues; refer to the syllabus throughout the academic term; provide an early "low impact" exam to provide feedback regarding comprehension before the first major exam; organize course content through visual tools (e.g., matrix boxes); and be explicit about expectations for excellence.

The third level and one of the highest level of involvement is for the faculty member to co-plan activities that occur inside the classroom and within the out-of-class SI sessions. Faculty members might also serve as SI supervisors and provide helpful feedback to the SI leader and perhaps the faculty member for whom the SI class is provided. Following are several examples of how SI can be used in a carefully planned manner to foster self-development of faculty members.

Wolfe (1990) describes the use of SI at Anne Arundel Community College (Arnold, MD) to provide services for both students and faculty members. Some faculty members serve as SI supervisors. The faculty member has several options to earn promotion credit for increased salary, one of which is to earn "professional development credit." Faculty who choose this option and are approved by the SI program help supervise the SI leaders (Wolfe, 1990). A faculty member who agrees to serve in this role is called a "Faculty Mentor." Wolfe received a grant from the Fund for the Improvement of Post-Secondary Education to initially implement this activity. Since the conclusion of the grant, the institution has continued the mentor faculty program.

An important feature of this program is that the faculty members supervise SI leaders in areas outside their content specialty. The faculty members focus on general learning skills, and not on critiquing the content of the instructor for which the SI is being offered. These faculty mentors attend classes and SI sessions with student SI leaders for the first four weeks of the term; these teachers become students in the course, attending class and taking notes with the SI leader. Before the SI review sessions, these master teachers, as skills specialists, work with the SI leaders, the content specialists. They prepare materials and plan activities. Following SI sessions, mentors offer constructive comments.

As students in a class that is outside their discipline, these faculty mentors have the opportunity to observe and learn different approaches and teaching techniques. They may also become a nonthreatening resource for integrating study skills into course lectures, readings, and assignments. Reported changes in behavior by the classroom teacher and the faculty mentor occur in three areas: procedural strategies (e.g., include board work and handouts, refer to course syllabus throughout the term), study strategies (e.g., classroom assessment techniques, review to reinforce major points), and group interaction (e.g., redirect questions back to other students or to the textbook, coach problem-solving among small groups).

Marshall (1994) reported on the use of SI for faculty enrichment at Salem State College. There was frequent interaction between faculty members and SI leaders through joint participation in SI leader training workshops, monthly meetings to discuss pedagogical issues, and weekly meetings to discuss SI participant comprehension level of in-class material. Faculty members reported numerous changes in their behaviors and improved attitudes.

Foundation and Theoretical Framework for SI

A New Paradigm

Traditional individual tutorial practices may be described as following a medical model: an individual is identified as needing professional assistance on the basis of: a) prior history and diagnostic testing, b) self-referral in response to perceived symptoms, or c) referral by another professional in response to observed symptoms. In some institutions, identification of high-risk students is based primarily on prior history of test scores (see "a" above). These tertiary institutions are likely to be somewhat selective, requiring students to submit to extensive pre-matriculation testing and interviews. Professional schools and private, selective colleges are among those fitting this category. Students entering such institutions typically commit for the long term and, at a minimum, can be expected to persist for at least a year. Under these circumstances, academic therapy with students at risk can begin immediately upon matriculation and can continue until students give evidence of being able to function independently in the academic environment (Martin, et al., 1977).

As noted in "b" above, some students self-refer. Their symptoms in these instances may range from free-floating anxiety in the academic setting to unsatisfactory performance in one or more highly specific settings. The tutor or resource specialist must function first as diagnostician, identifying the basis for the students' self-referral and differentiating between anxiety and a variety of other reasons for unsatisfactory performance. Having established at least a tentative diagnosis, the tutor then becomes the therapist, helping the student to negotiate the academic demands of the institution (Martin, et al., 1983).

Use of "c" above requires another professional, usually a professor or graduate teaching assistant, to become aware that a student is in academic difficulty. This awareness may come in a variety of ways, most likely in the wake of unsuccessful performance on an academic task. For example, the faculty member may refer the student for tutorial assistance to correct an academic problem that has become apparent because of a low test score. In this instance, the tutor functions, as described in the previous paragraph, first as a diagnostician and then as a therapist.

It was in a milieu dominated by tutorial services in the medical model that SI developed. The developers at UMKC found that several assumptions of the medical model either did not apply or were not practiced in their institution. Subsequent adoption of SI on other campuses may suggest that the same assumptions were found wanting on these other campuses as well.

As noted, the traditional model relies on identification of the "high-risk" student, the student who is deemed to be deficient or "at-risk" in some way. In institutions other than those described, (i.e., selective tertiary and professional schools), several factors preclude such pre-matriculation identification. First, entering students must be known to the faculty and staff in time for key personnel to establish contact with at-risk students. Second, it must be noted in this context that neither prior performance nor standardized testing is sufficiently reliable as a prediction criterion of who is and is not at risk. As many as 50 percent of those whose prior scores suggest they are at risk prove to be successful without intervention, and many of those who are not identified in this manner prove to be unsuccessful (Martin & Blanc, 1981).

Analysis of high school grades and standardized college entrance examinations do not identify all students who will drop out of college for academic reasons (Blanc, et al., 1983; Christie & Dinham, 1991; Martin et al., 1983; Tinto, 1987) and attrition cannot be addressed effectively by providing help only to those students who show either symptoms or predisposing weaknesses. The treatment must be more generalized, and the problem must be addressed at or near its source: the mismatch between the level of instruction and the level of student preparation (Martin, et al., 1977). Timely identification of students who are at risk is difficult in the traditional model. Faculty who can refer students for corrective instruction are rarely able to make a referral before the scoring of the first course examination. Students who are referred after that time are a considerable disadvantage, trying to catch up with the class after a very poor start. The rate of student attrition across courses is greatest in the first six weeks or after the first exam when students may find their grades disappointing (Blanc, et al., 1983; Noel, et al., 1985). Students who are at risk are among those least compliant with faculty recommendations for special help, whether for personal counseling or for academic assistance. Such students often perceive that tutorial help, far from relieving them of their academic burden, increases the burden as they must now answer to a tutor in addition to the course professor. Finally, students who are at risk are notorious for their reluctance to refer themselves for assistance until much too late. Whether through denial, pride, or ignorance, students who need help the most are least likely to request it. So goes the axiom of the learning assistance trade (Somers, 1988).

SI first developed in an institution that did not fit into the medical model described previously in this chapter. At UMKC, students can register as late as the first day of class, with their prior transcripts and test score data to be submitted sometime before the beginning of the following semester. This large, inner-city, commuter institution, typically turned over 40 percent of its students each semester, most of them due to transfer but some due to the phenomenon now known as "stopping out" as distinguished from "dropping out." "Stopping out" referred to the widespread practice of taking no classes during a semester that would be devoted to other priorities such as working to reestablish a bankroll sufficient to allow subsequent reentry.

Delivery of services from the first day of class changes the support program from a reactive to a proactive mode. One of the non-cognitive variables that differentiates between more capable and less capable students is this: those who are less capable are inclined to do without support services until they need them; those who are more capable will avail themselves of services at the beginning and stop services if they find the services to be neither productive nor essential. The presence of these more capable students in support sessions affirms that the sessions are not remedial. That fact enables less capable students to participate without the fear of stigma (Martin, et al., 1977).

The integration of skills and content allows the SI leader to meet the perceived content needs of students while delivering essential skills instruction simultaneously. If, as McLuhan argued, "the medium is the message," then the message of SI is skill instruction, delivered along with the course content material.

Delivering services on an outreach basis, (i.e., in the classroom buildings assigned for regular academic instruction), lends an air of academic credibility to the support service. Similarly, the overt endorsement of the SI program from the participating course professor lends further authority to the claim that SI is valuable.

Of course, the voluntary nature of the SI pact--which is renewable every week (or every day, for that matter)--comforts the wary student who shuns taking on additional responsibility. The combination of voluntary participation, early intervention, and proactive support differentiates the SI model from the traditional medical model that relies on diagnosis of signs and symptoms followed by prescriptive treatment.

The following describes some theorists and researchers whose work the SI developers found particularly helpful. A conscious decision was made to base the SI model on a developmental perspective because that perspective puts the burden of responsibility on the service providers. Such a theory base assumes that the students will learn if the conditions for learning are in place. The leading researcher in the developmental field at the time the SI model was created was Jean Piaget. Robert Blanc is to be credited with anchoring SI in a developmental framework and designing original research studies (Blanc, et al., 1983; Martin, et al., 1977).

Constructivism

Jean Piaget formulated a comprehensive model of cognitive development. Although Piaget studiously avoided prescriptive statements concerning education, preferring to confine his studies to epistemology, several of those with whom he worked have applied his insight to education. The conclusion of this line of research as it applied to SI is this: many students in tertiary educational institutions have not yet developed abstract reasoning that will allow them to learn new ideas simply by listening to lectures and reading text. In recent years, some of Piaget's ideas have been formalized into an educational theory called "constructivism." Proponents of constructivism take their name from Piaget's observation that students must "construct" their own knowledge to be able to understand and use it.

Many constructivists make a clear distinction between information and knowledge. Information is easily transmitted through telling. On the other hand, "gaining knowledge means gaining expertise" (Blais, 1988, p. 3). Learners must be actively involved in constructing the knowledge themselves and understand how to use it. Blais (1988) continues by stating that "telling" students actually perpetuates remedial processing tendencies that many students possess. Good SI sessions model thinking behavior that cause participants to engage the material (i.e., lecture notes, textbook, outside readings) and construct "knowledge" and not just review the "information."

Students typically perceive their need as entirely content-centered. Experience shows, however, that the most common need among marginal students is for the learning and thinking skills that are basic to content mastery. Arons and Karplus (1976) observed that 50 percent of entering college first year students did not have reasoning skills at the "formal," ("abstract") operational level described by Piaget and Inhelder (1958). The popular and professional literature has not reported improvement since these early studies.

Students who appear to operate at the concrete (i.e., nonabstract) level consistently have difficulty processing unfamiliar information when it is presented through the abstract mediums of lecture and text. Their questions about material are often detail-oriented and superficial. Rarely do they ask or answer questions that require inference, synthesis, or application. They can operate at more advanced levels once they have mastered a concept; but, to do so, they require regular instruction that either anchors the concept directly in their previous experience or provides a concrete experience with data from which the concept may be inferred (Blanc, et al., 1983; Fuller, 1980; Karplus et al., 1976; Renner et al, 1976).

A variety of tasks can present overwhelming obstacles to individuals who have not attained the advanced stage of intellectual maturity that Piaget and Inhelder (1958) identified as formal or abstract. This problem is complicated in foundation courses where the most common means of assessment is detail-oriented exams, which, by their design, reinforce rote memory. It is, therefore, possible for students both to achieve high marks in courses and to fail to understand the principle concepts that must be assimilated if they are to retain and use the memorized material. The effect of these differences in learning patterns surfaces in more advanced courses that require students to display integration and application of the knowledge they have previously acquired (Chaffee, 1992).

Another leader in the Constructivist movement was Lev S. Vygotsky. He created a concept called The Zone of Proximal Development. This Zone was the gap between where a learner can operate independently and the higher level that the learner could operate at if they were interacting with more capable peers. Through continued practice, the learners increase their capability to think since they are being encouraged by the more capable peers to extend themselves to higher levels of thought (Bruffee, 1993, p. 39; Vygotsky, 1978, p. 86).

One task of the SI leader is to guide students as they raise their operational levels (Martin, et al., 1983). Specifically, SI leaders focus on intellectual tasks such as the identification and control of variables, a reasoning skill common to both the natural and social sciences as well as mathematics. Similarly, SI leaders focus on helping students to recognize proportional relationships and to use ratio reasoning when it is appropriate to do so. Although students can use hypothetical/deductive reasoning on an informal or intuitive level, they often need help to see the relevance of this kind of thinking in a formal academic discipline. Application of the idea of probability, on the other hand, often escapes students unless direct attention is drawn to it. A task of the SI leader is to make explicit the instances in which the aforementioned reasoning patterns and processes are implicit in either lecture or text.

The SI leader functions in another key role to help students attain academic maturity: the leader helps students to analyze their own learning. This metacognitive approach to learning finds application in its most basic form when the SI leader helps students to figure out what they do and do not understand about a concept and then to frame questions that eventually will lead to their more thorough understanding. Skilled and experienced learners know how to judge their own understanding and to ask such questions. Less successful learners often fail to distinguish between what they do and do not understand. SI leaders, then, must be sensitive to levels of student development and performance across a wide spectrum.

Some constructivists (Vygotsky, 1962) see collaborative peer group learning activities as preparing learners to become independent in the future. Consistent with this goal, SI encourages similar development since SI sessions, SI leaders, or even other forms of collaborative learning groups may not be available in the future. It is development in this dimension that we believe helps to explain why there are long-term benefits to SI participation (i.e., increased re-enrollment and graduation rates).

Dale's Cone of Experience

Compatible with Piaget's theory base is Edgar Dale's Cone of Experience (Dale, 1969) which conveys some of Piaget's ideas on learning in a graphic form. Proven useful for working with students in lower grades, this model is also relevant for working with college-aged students. Dale proposes that learning is stimulated progressively from concrete (i.e., hands-on) experiences to abstract (i.e., verbal and visual) symbols. The foundations for instruction reside in direct sensory experiences combined with purposeful interaction with the stimuli sources. Dale's Cone is most useful as a guide for introducing and building concepts. At the most basic and most effective level of instruction, students are introduced to new material through an actual hands-on experience or "doing the real thing." Students see, do, and talk about the concept. Learning is the most complete if these conditions can be met.

At the top of the cone, or triangle, is lecture and text. Dale's model suggests that these passive instructional modes are the least effective ways to introduce new concepts to students. Between the top and the bottom of the cone, Dale has several other levels of instruction including giving a talk, watching a demonstration, seeing a film or picture. For SI leaders, experience with Dale's Cone helps them design the instructional activities to meet student needs.

Tinto's Model of Student Retention

Tinto's model of student retention is one of the most frequently cited in professional literature. Tinto's research suggests that students who are integrated into both the academic and social dimensions of the institution are more likely to persist (Tinto, 1987; Tinto in Spann, 1990). Institutions bear part of the responsibility for student success since the decision to leave an institution is more a function of what occurs during the college experience rather than with what preceded it (Tinto, 1987). Tinto continues:

> Drawn from the work of Durkheim and Van Gennep, this theory will argue that colleges and universities are like other human communities; that student departure . . . necessarily reflects both the attributes and actions of the individual and those of the other members of the community in which that person resides. Decisions to withdraw are more a function of what occurs after entry than of what precedes it. They are reflections of the dynamic nature of the social and intellectual life of the communities housed in the institution, in

> particular of the daily interaction occurring among its members. Student departure may serve as a barometer of the social and intellectual health of institutional life as much as of students' experiences in the institution. (Tinto, 1987, p. 6)

Nationally, high rates of student attrition among first-year college students continue to be a trend (American College Testing Program, 1999). Tinto identified four significant factors in student attrition (Tinto, 1987; Tinto in Spann, 1990): many students feel socially isolated on campus; students have difficulty in adjusting to the new environment; students suffered from incongruence (i.e. they are not able to link the knowledge received from class lectures to what they already understand); and students have trouble in the college environment.

The SI Program can be part of a broad institutional response to help address these four factors. The SI review sessions provide a safe environment within which students can discuss and process the course material with others. SI students become acquainted with one another as they interact. The SI leader facilitates the discussion so that students can adjust, discuss what they do not understand, and discover strategies that unlock the mystery of learning at college. SI participants experience more academic success in target courses than their non-participating peers (Martin, et al., 1977, 1983, 1990).

A key concept in Tinto's model is that the departure decision for a student is more heavily influenced by experiences with the college environment than by the previous academic and social experiences that occurred before college attendance. The institution has an opportunity to manipulate its environment to provide, through informal and formal contacts, an opportunity for the student to be integrated into the social and academic dimensions of the institution.

Rather than remain powerless in the face of high attrition, the institution can decide to make available resources and to change its campus environment. SI is a viable and effective option for changing the campus environment. Through SI, students become less isolated and are helped in assimilating into the culture of the institution, both academically and socially.

Keimig's Hierarchy of Learning Improvement Programs

Keimig (1983) developed a "Hierarchy of Learning Improvement Programs" by which programs were differentiated on the basis of two criteria: the comprehensiveness of the program and the degree to which the program was institutionalized into the overall academic delivery system. Highly ranked programs were not isolated, but were integrated into the heart of the institution. From lowest to highest, the four levels of programs in Keimig's hierarchy were: isolated courses in remedial skills, tutorial assistance to individual students, course-related supplementary learning activities, and college courses that have been significantly changed and have comprehensive learning systems built into them.

Remedial courses were rated lowest by Keimig since they often taught academic skills in isolation from actual course content. It was very difficult for students to transfer successfully the skills necessary to succeed from the remedial course to other college-level courses. Students soon reverted back to their old habits. Sometimes, the exit competencies required in the remedial courses were not as high as the entry level prerequisites for the introductory level college courses.

In terms of long-term effectiveness, tutoring was also rated near the bottom of the academic support hierarchy. Keimig found four major disadvantages with individual tutoring: 1. Because of its "drop-in" nature, it lacked systematic activity; 2. Tutoring failed to provided enough assistance soon enough to make a difference; 3. The assistance was too late since it generally came after academic difficulty or failure has been experienced; and 4. The students who needed tutoring the most generally used it the least.

In a review of the professional literature concerning tutoring, Maxwell (1990) observed the following: some students find that high-ability or more experienced students benefit most from tutoring; it is rare for studies to show that tutored students improved their grades; thee is no evidence that tutoring helps the weakest students.

Using Keimig's model, programs similar to SI were ranked near the top of the effectiveness scale since, ". . . students' learning needs are presented as being necessary because of the nature of the objectives and content of the course rather than because of students' deficiencies. Therefore, all students have access to supplementary...instructional experiences which benefit nonremedial students as well"

(Keimig, 1983, p. 23). The key to program success is the link between academic services and specific courses.

Keimig's description of the highest level of program in her hierarchy, the comprehensive learning system, was reserved for classes where the professor has make significant changes in his/her instructional delivery. "The student's overall developmental needs are provided for, including interpersonal and affective needs and cognitive and requisite skills. The instructor monitors students' responses (including learning) and adjusts teaching strategies and learning experiences individually" (Keimig, 1983, p. 24).

It should be noted, however, that some institutions (e.g., Salem State University) have introduced SI through faculty development grants. Because the SI leaders and the course professors worked closely together as a team to meet student needs, the SI program at Salem State would meet Keimig's "highest" level. The SI program, as it is usually implemented, complements the professor's instructional style and requires no change by the professor in the way the instructional material is initially delivered. Most professors would not choose to modify their courses to fit the criteria for Keimig's Level Four designation. Therefore, SI is able to fit the criteria for the highest rated type program that does not require professors to change their instructional style. Using SI to facilitate faculty development, however, appears to be a growing trend within institutions not only here in the United States, but in other countries also.

Metacognition and Cognitive Psychology

The field of metacognition is concerned about the awareness of learners as they participate in the act of learning and their choices of learning strategies as appropriate to the situation. “Situated cognition” focuses on helping learners to effectively use learning strategies within the academic context (Hattie, Biggs, & Purdie, 1996). Students skills in knowledge organization has a dramatic impact upon the learning process (Pintrich & Garcia, 1994).

A leading researcher in this area is Dr. Claire Weinstein. In her research, Weinstein and some of her colleagues have identified variables that separate expert and novice learners: experts know more; knowledge held by experts is better organized and more integrated; experts have more effective and more efficient strategies for accessing and using their knowledge; experts seem to have different motivations for acquiring and using their knowledge; and experts evidence more self-regulation in both the acquisition and application of their expertise (Weinstein & Stone, 1996). Weinstein has identified four kinds of knowledge that expert learners need: knowledge about themselves as learners (e.g., their cognitive characteristics); knowledge about the cognitive demands of the academic tasks; knowledge of a variety of strategies, tactics, and study skills; and prior knowledge of the content material (Weinstein & Stone, In press).

SI leaders can play a valuable role in helping students move from the "novice" stage to the "expert" stage. Through a variety of activities, SI sessions provide constant feedback so that SI participants are aware of their comprehension level of the course material before major examinations. This gives them opportunities to correct and change study behaviors before the penalty of a low examination score. SI leaders can model and use a variety of learning strategies during the SI sessions. SI participants have the opportunity to practice these activities during the sessions before leaving the group to go back and use the strategies by themselves when they study alone. Since the SI leader has already taken the same class as the SI participants, the SI leader can share what kinds of cognitive demands will be required for the particular class that they are enrolled in. SI leaders can help students discover the links between prior content material, current material, and preview future course content.

Weinstein states, "An expert learner is a self-regulated learner. Self-regulated learning requires skill, it requires will, and it requires executive control" (Weinstein & Stone, 1996, pp. 9-10). SI sessions are designed to lead students to become independent learners.

Collaborative Learning

The effectiveness of peer collaborative learning has been well researched and documented. Early theorists--Dewey, Piaget, and Bruner--provided clear direction that leads to the value of peer collaborative learning. Developmental psychologists carried on the early research, and recent research in college student development and retention lends further empirical support.

Since its inception in 1973, the SI model relied on peer group learning, now described as collaborative learning (Tomlinson, 1989; Whitman, 1988). A recently completed comprehensive annotated bibliography on collaborative learning (Tumey, 1993) includes reference to the SI model in over fifty collaborative learning citations, giving SI a significant representation.

As Maxwell (1979) has noted, however, most of the research and work on collaborative learning had previously been conducted at the elementary and secondary school level; its systematic introduction to postsecondary education and research on its effects in higher education settings only date from the 1970s. However, several researchers have documented it increasing influence in higher education in recent years (Cooper, et al., 1990; Goodsell, et al., 1992). The success of Treisman and Fullilove (1990) in improving academic performance of non-Caucasian mathematics majors has generated widespread interest in his academic program that includes, as an important component, collaborative learning.

When comparing students studying alone to those studying in groups, educators have found that group study results in higher levels of thought and increased retention of information (Johnson et al., 1991; Light 1990, 1992). Research conducted by Light (1992) at Harvard University found group work particularly important for persistence in science courses. Shlipak (1988) also found that group work was very important for the persistence of women in the physical sciences.

In addition to improved academic performance, it is generally believed that students enhance their self-esteem through collaborative learning. "Considerable evidence shows a collaborative environment will elevate students' feelings of self-worth more than a competitive one" (Sandberg, 1990, p.2). Students will not have an opportunity to increase their self-confidence if they do not have an opportunity to practice their skills. Traditional classrooms with a lecture-based format typically fail to provide an opportunity for peer-group interactions. SI sessions provide a safe and non-threatening environment for students to clarify their understanding and practice newly learned skills. Mastery of content material leads toward increased self-confidence.

Some researchers have suggested that collaborative groups provide a better learning environment for returning women students than traditional lecture-based classes (Belenky et al., 1986). Other researchers cite the cognitive and affective domain increases with the support of peers for high-risk students (Brookfield, 1987;

Johnson et al., 1984, 1986, 1991; Resnick, 1987; Slavin, 1983, 1988, 1989/90). A program of Supplemental Instruction can be one component in a comprehensive plan to help change the campus climate for today's diverse student body.

Summary

Supplemental Instruction is another vehicle for delivering some of the best practices of developmental education. It was created as a response to a high proportion of professional students who were dropping out of UMKC since they could not pass historically-difficult courses. The concurrent development of "what to know" with "how to know it" using the SI methodology was a unique innovation that has been replicated at hundreds of colleges around the world.

Learning Assistance Program Design

Researchers suggest that close coordination with both academic affairs and students affairs can enhance the effectiveness of the learning assistance center in meeting the academic needs of students (Martin et al, 1977; Skarkey et al, 1987). Usually, these discussions on the need for coordination with academic and student affairs have been mostly philosophical discussions that are not based on empirical evidence (Reed & Dozen, 1982). Roueche and Snow (1977) argued that academic credibility and instructional commitment was higher when developmental education programs had strong working relationships with academic departments. Maxwell (1997, p. 84) stated that "Ideally, the learning center belongs under the administrator who can provide maximum support and nurturing for its roles and functions and who will permit the director autonomy. The precise administrative structure in which these conditions are optimal varies from institution to institution, and historical precedence, power politics, and departmental feuds are important factors in choosing a structure." Maxwell remarks that a growing trend among large public universities for the learning center to be located under various units within academic affairs.

There has not been much empirical research since the early design of learning assistance programs (Maxwell, 1979). Most of the discussion has focused on encouraging learning assistance administrators to employ Management-By-Objectives (MBO) in managing their programs (Christ, 1970, 1971, 1977, 1980; Deegan & Fritz, 1975).

Greenlaw, Anliker, and Barker (1997) studied the administrative placement of new student orientation programs. Nearly two-thirds of such programs were located within student affairs with the remaining responses divided among academic affairs and shared governance of both student and academic affairs. While academic affairs provided more stable budget appropriations, higher faculty support, higher credibility, and greater emphasis on academic issues, location within student affairs fostered many more advantages. The highest frequencies of responses were: more resources to support the program, more freedom to experiment and greater holistic student development. The authors argued that appropriate placement of orientation programs was often a function of the local campus culture and institutional mission rather than arguing that placement under one administrative unit was universally superior to any other. Many citations were provided regarding the benefits of programs that drew upon resources from both academic and student affairs (Brown, 1989; Gardner, 1986; King, 1993; Mullendore & Abraham, 1994; Murphy, 1989; O'Brien, 1989).

Several national surveys studied the administrative placement of learning assistance and developmental education programs. However, neither of the national surveys studied the relationship between administrative placement with program or student outcomes. Boylan, Bingham, and Cockman (1988) reported that a national sample of developmental education programs reported to academic affairs nearly 79 percent of the time with student affairs a distant second with 12 percent and all other variations of other administrative units the remaining 9 percent. The most common title of the administrator to whom the program reported was the Dean of Instruction of Academic Vice President (61 percent). The authors speculated that the high level of administrative reporting provided additional prestige and power since they have access to high-level policy makers.

Lissner (1990) conducted a national survey of learning assistance programs regarding descriptive information regarding their staffing, structure, and services. A total of 473 (13.6%) of the institutions responded to the survey. Regardless of institutional type (public vs. private, 4 year vs. 2 year), learning assistance programs reported to various levels of academic affairs two-thirds of the time and approximately one-third of the time to either a chief student affairs officer or director of the counseling center.

When research has been conducted concerning the effectiveness of learning assistance programs, the administrative placement of the unit has not been a variable considered in terms of understanding the differences in program effectiveness (Bonham, 1990; Boylan, 1982, 1985; Carman, 1970; Kulik, et. al., 1983; Martin & Blanc, 1981; Morante, 1986; Rosen, 1980; Roueche, 1983; Somers, 1987).

This makes the area of administrative placement important for research to inform the professional field regarding potential efficacious administrative placement of developmental education and learning assistance programs.

Review of Research Literature Concerning SI

Supplemental Instruction is well represented in the professional literature. There are more than 450 citations including those that are dissertations, books, book chapters, monographs, articles, conference proceedings, and other forms of media. Arendale (1999) provides annotated entries for each of these citations in the literature or media. Following is a brief summary of only published doctoral dissertations or masters theses that relate to SI. While this literature was predominantly produced at the masters' level in the 1980s, most is now being conducted at the doctoral level since 1990. The appendix contains the complete annotated bibliography with description of research findings in a variety of publications and media. In addition, more than 120 publications related to SI are available at the SI web site (http://www.umkc.edu/cad/si/).

Many dissertations focused on quantitative research studies concerning whether SI contributed to higher academic achievement. Eberling (1998) investigated the relationship between grade point average and study habits/attitudes of students at a community college. Fisher (1997) studied the effects of participation in SI on student academic achievement, motivational orientation, and learning strategies in a psychology course at Auburn University. Hodges (1997) investigated the effect of high-risk students' self-monitoring strategies and instructors' use of verbal prompts on high-risk students' attendance in tutoring and SI on their academic achievement. Jarvi (1998) conducted both a quantitative and qualitative study concerning academic achievement of SI participants at a large New England research university. Kenney (1989) conducted one of the most rigorous studies with students at the University of Texas at Austin in a calculus course for business and economics majors. McGinty (1990) used a path analysis to study the relationship of SI participation with students at the University of Texas at Austin. Merwin (1991) compared the efficacy of traditional tutoring and SI with students enrolled in an English course at Northern Montana College in Havre. Pryor (1990) examined academic achievement among students at Western Michigan University. Stephens (1995) employed a quasi-experimental research design to study developmental education students enrolled in a mathematics course at the University of North Texas.

Several dissertations used a qualitative research design to study the relationship of SI participation to behavioral changes of the SI participant or the SI leader. Ashwin

(1993) studied the relationship of the educational theory of SI and whether it matched the student experience of it at Kingston University in England. Carson and Plaskitt (1994) conducted their research with students at the University of Port Elizabeth in South Africa to study why students believed that SI was helpful. Collins and Ronaldson (1995) replicated the research of Carson and Plaskitt at the University of Port Elizabeth in South Africa. Kotze (1994) studied entry-level students in a mathematics course at the University of the Orange Free State in South Africa. Metcalf (1996) employed both quantitative and qualitative measures to study changes in student leaders who provided academic assistance to others.

Most Master's thesis papers concentrated their research efforts on the academic achievement of students. Anker (1991) compared academic performance of students who participated in SI sessions and those enrolled in a pared study skills course at Calvin College in Michigan. Clark (1998) focused on academic achievement of students in a history course at Southwest Texas State University in Texas. Douma (1988) evaluated the effects of SI in a variety of courses at Southwest State University in Minnesota. Hibbert (1996) studied the influence of SI in sociology courses at the University of Texas at El Paso. Kastelic (1997) examined a SI program that provided academic credit for participation at a community college in northern California. McGrath (1988) examined student academic achievement at Greenville College in Illinois. McManus (1992) studied students at North Carolina State University at Raleigh in an introductory mathematics course regarding their academic achievement. Peoples

(1993) studied the efficacy of SI with junior high school students with a disability enrolled in Overbrook Junior High School in New Jersey. An exception to these studies is one by Davis (1999) which employed a qualitative design to study SI leaders and SI participants. Davis studied SI leaders at Indiana University Purdue University Indianapolis to understand the benefits of their participation in the program.

Previous doctoral dissertations and masters' thesis papers have employed quantitative and qualitative designs to study the relationship of SI participation to behavioral changes by SI participants and SI leaders. Studies with similar purposes have been published in a variety of other venues (Arendale, 1999). None of the published literature related to SI has ever studied the potential relationship of administrative placement or fidelity to the SI program guidelines to academic achievement of students or satisfaction level of the campus SI supervisor with the SI program.

Conclusion

This chapter has been devoted to developing an understanding the broader context of developmental education and learning assistance for students in general and Supplemental Instruction in particular. Developmental education has been a critical component of higher education since the founding of postsecondary education in America since the 1600s.

While this review of the literature has described the past and the current practice of Supplemental Instruction, it has not examined possible specific actions to improve the practice. The next section will examine whether administrative reporting patterns and

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fidelity to the specific components and activities of the SI model are related to improved effectiveness of the SI program.

CHAPTER THREE

METHOD

Purpose of This Study

Developmental education and learning assistance programs are increasingly being called upon to meet the academic needs of students who are academically underprepared and to serve the larger student body who want to participate in academic enrichment activities for their personal development. Research is needed to identify variables that can improve the SI program's effectiveness in academically assisting students through an enriched learning environment and to do so in a cost-effective, research-based manner.

No previous research has been conducted concerning the possible impact on SI programs based on different administrative placement or the implementation of specific SI program activities recommended by the developers of the SI model at UMKC (Arendale, 1999). There has been variation among learning assistance programs regarding their effectiveness in contributing to the academic success of students. Due to the critical need to improve the effectiveness of assistance programs overall and for the SI program in particular for students, it is important to collect data about these variables.

It is possible that administrative placement within either academic affairs, student affairs, or another administrative location might have an important influence on providing a supportive environment for the SI programs to serve students through the following: more assignable program personnel; increased budget funds; additional political influence; increased campus respectability and prestige; or other variables. Different activities recommended for implementation with the SI model may be more important for contributing to higher student achievement and satisfaction ratings by the campus administrators who supervise such programs. With limited staff and financial resources, it is important to devote the most energy to those activities that contribute the highest to the desired outcomes and to de-emphasize other low-yield activities.

While the SI National Training Center at UMKC provides a detailed three-day workshop for SI Supervisors to attend, there has not been research-based studies to identify which specific SI program activities are critical for improving student academic achievement and campus SI program satisfaction levels.

Therefore, this research has two purposes. The first was to investigate factors that may have a direct or indirect influence upon the effectiveness of the SI program to improve the academic performance of students that participate in the program (higher mean final course grades in the classes in which they receive academic assistance, lower rates of withdrawals, higher rates of persistence toward graduation). The second purpose of this research was to identify practices that improve the effectiveness of the SI program and result in higher academic achievement for SI participating students and higher levels of satisfaction by the campus SI coordinator.

This study conducted research regarding the four SI program activity constructs (representing twelve separate and specific SI program activities) cited in the 1999 SI Supervisor Training Workbook as essential for SI program success. These four constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) have been consistently listed as essential in all major SI publications written or edited by Deanna C. Martin, creator of the SI model at the University of Missouri-Kansas City (Martin &Arendale, 1994; Martin & Arendale, 1993; Martin, et al., 1983; Martin, 1980; Martin, et al., 1977).

Variables Examined

Study #1: Analysis of the SI Program at UMKC

The first study examined the SI program at the University of Missouri-Kansas City. This study reviewed major independent variables (final course grades in classes that offered SI, reenrollment rates of students who were in classes that offered SI) and dependent variables that may have a statistically significant relationship to the independent variables. The data included a representative class that offered SI during Fall 1998. This study provided an in-depth examination of the original SI program and provided bench marking data for comparison with the national study.

The course selected for analysis was General Chemistry I (Chem 211). This course is commonly selected by many UMKC students to fulfill graduation core requirements of a science course with an attached laboratory experience. Nearly an equal number select the General Biology I course for similar reasons. The chemistry class meets four times each week for an hour each time and a separate laboratory session lasts for approximately two hours. Course topics include: stoichiometry, atomic structure, states of matter, thermodynamics, equilibrium, and kinetics. A prerequisite or corequisite for enrollment in General Chemistry I is Algebra and Trigonometry (Math 120). Topics for class lectures include: review of elementary algebra, solution of equations, functions, inequalities, systems of linear equations, exponential and logarithmic functions, trigonometric functions, trigonometric identities, triangles, equations of second degree and their graphs, binomial theorem, complex numbers, and polynomials. A single textbook is used for the course. There are four major examinations administered in General Chemistry I (each based on one-fourth of the content material) with each employing multiple-choice questions drawn from the lecture and textbook.

General Chemistry I was selected for several other reasons: served by the SI program for more than a decade; sufficiently large enrollment to permit regression statistical analysis (128 students); percent of SI participation rate was similar to historic averages for UMKC campus courses; and rigorous course material since it required competency by students in both science and the underlying basis in mathematics.

Focusing on a single class for analysis presented several advantages over attempting to collapse all the SI courses for the academic term into one large meta analysis. First, it controlled for the potential confounding variables from the many classes by different professor teaching styles, varying experience levels by SI Leaders, variations presented by content of the different academic disciplines, and other unanticipated differences. Another reason for focusing on a single course was to avoid having the same student appear multiple times in the study due to enrollment in other classes that had SI offered during the same academic term (37.9% were enrolled in two classes that had SI offered; 15.3% where in three such classes; and 0.3% were enrolled in four classes).

This research study employed current education research and evaluation theory to guide the quantitative studies. Study #1 examined variables that may be related to improved student outcomes such as higher academic achievement and increased persistence toward graduation. The Input-Environment-Outcomes (I-E-O) evaluation model was utilized for this study (Astin 1993, 1991, 1977, 1970b, 1970a, 1962). Outcomes (student characteristics after exposure to the environment) are related to the Inputs (characteristics of the student at the time of initial entry to the institution) and interactions with the Environment (various experiences to which the student is exposed). Rather than a "true experimental" study where all variables are controlled and manipulated, Astin's I-E-O research evaluation model is "natural" study that looks at the students' interaction with the environment (e.g., participation with SI). This research design produces a correlational study of the relationship of the variables. The magnitude of effect should be proportional to the degree of exposure (Astin, 1993, p. 28).

TABLE 2

UMKC SI STUDY RESEARCH DESIGN

Input Variables	Environmental Variables		Outcome Variables
	Bridge	Involvement	
1. Student Demographics a. Ethnicity and race b. Gender c. Age d. Student classification (e.g., first-year, sophomore) 2. Previous precollegiate academic achievement a. ACT/SAT scores b. High school graduation rank percentile	1. Initial student motivation to attend SI sessions	1. SI attendance	1. Final course grades in SI course a. Final course grade b. Final course grade of A and B c. Final course grade of D, F or withdrawal d. Course withdrawals 2. Enrolled at UMKC following 12 months

Based on Astin's Input-Environment-Outcome Evaluation Model (1993, 1991, 1977, 1970b, 1970a, 1962)

Study #2: Analysis of SI Programs in the U.S.

The second study examined the 735 post-secondary institutions in the United States that sent faculty or staff members to attend a multi-day SI Supervisor training workshop sponsored by The University of Missouri-Kansas City. Questionnaires were sent to the people who attended the training workshops since they began to be offered by UMKC in the early 1980's. Four dependent outcome variables were examined: mean final course grade difference between SI and non-SI participants; mean percent of D and F final course grades and course withdrawals between SI and non-SI participants; SI participation percentage; and satisfaction level with the SI program by the local SI program administrator.

An input variable of SI program administrative placement was examined first. Following that, the length of time that the SI program had been in existence was examined. The four SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) were then analyzed for their potential impact upon the dependent variables.

TABLE 3

NATIONAL SI STUDY RESEARCH DESIGN

Input Variables	Environmental Variables		Outcome Variables
	Bridge	Involvement	
1. SI Program administrative placement (academic affairs, student affairs, joint, enrollment management, other)	1. Age of the SI program	SI Program Fidelity Constructs: 1. SI Supervisor involvement 2. SI Leader involvement 3. SI Leader training 4. Institutional involvement	1. SI program status (e.g., active, discontinued) 2. Student academic performance a. Mean final course grade gain in SI course b. Mean reduction of final course grades of D, F, or withdrawal in SI course c. Percent of students participating in SI 3. Satisfaction level of the SI supervisor with the SI program

Based on Astin's Input-Environment-Outcome Evaluation Model (1993, 1991, 1977, 1970b, 1970a, 1962)

TABLE 4

SOURCE OF VARIABLES FOR NATIONAL SI STUDY FROM THE SI PROGRAM QUESTIONNAIRE (SIPQ)

Variable Description	SIPQ Question #
Independent Variables	
SI program administrative location	Q #4
Age of SI program	Q #8 and #9
SI program fidelity constructs (1-4):	
1. SI program supervisor involvement:	
a. Frequency of SI program evaluation	Q #13
b. Frequency of supervision of first-time SI leaders	Q #23
c. Frequency of supervision of experienced SI leaders	Q #24
d. SI supervisor knowledge of SI	Q #25
2. SI leader involvement:	
a. Frequency of SI leader class attendance	Q #19
b. Frequently used SI session activities	Q #28
c. Time when began to offer SI sessions during academic term	Q #30
d. Frequency that SI sessions are offered each week	Q #31
3. SI leader training:	
a. Quantity of SI leader training before academic term	Q #20
b. Quantity of SI leader training during academic term	Q #21
c. Percent of UMKC SI leader training manual used	Q #22
4. Institutional involvement (faculty member involvement)	Q #29
Dependent Variables	
Status of SI program (active+temp. inactive; discontinued)	Q #1
SI course difference in final course grade	Q #14
SI course difference in D, F, and withdrawal final course grade	Q #15
SI course participation rate of SI attendees	Q # 16
Satisfaction level of the SI supervisor with the SI program	Q # 17

Study #2 examines variables that may be related to higher student outcomes such as higher academic achievement and higher satisfaction rates by campus administrators who work with the SI program. This study will assess SI program implementation. King, Morris, and Fitz-Gibbon (1987, p. 9) argue that limiting evaluation to only program outcomes can potentially answer only the question of "did it work" and not the deeper question of "what worked and what did not" and how those variables contributed to the final outcome. "Program implementation research" focuses on the process of the intervention rather than only on the final product and potentially can yield much valuable information to permit program revision and improvement. This research has never been conducted regarding the implementation of the SI program at hundreds of institutions throughout the United States.

The variables were obtained from the SI Program Questionnaire (SIPQ). The SIPQ, designed by the researcher, provided both six independent and four dependent variables. The face validity of the SIPQ was established through a panel review of appropriate experts in the fields of academic and student affairs prior its administration. This panel will include the original creator of the SI model (Deanna C. Martin), National SI Staff at UMKC, Certified SI Trainers, and directors of several SI programs in the U.S.

The first predictor or independent variable was the "Administrative Placement" of the SI program. A review of the professional literature suggests that the respondent to the SIPQ will select either student affairs or academic affairs. The next section of the SIPQ inquires regarding the "SI Program Fidelity." This is the degree by which the SI program has been implemented at the local institution in comparison with national SI program implementation criteria established by the National Center for SI at UMKC. This generated a Likert scale score on specific activities recommended by UMKC.

The four dependent variables created by data from the SIPQ were the outcomes of the SI program. These were four criterion or dependent variables. The "Mean Grade Difference" between SI and Non-SI participants was the first of the SI program outcome variables. The Mean Grade Difference showed the difference in final course grades between students who either did or did not participate in the voluntary SI academic assistance program offered in specific courses at each institution. When studying the national data base for all SI participants, the data showed that the mean final course grade for SI participants is one-half letter grade higher than nonparticipants, controlling for ethnicity, previous level of academic achievement, and/or motivation to attend voluntary SI academic assistance sessions. The respondent to the SIPQ will subtract the mean final course grade of non-SI participants from the mean grade for SI participants. This was expected to be a positive number since SI participants usually earn higher mean final course grades than the nonparticipants. Higher positive numbers suggest that the SI program has been effective in helping students achieve higher final course grades than the non-SI participants. However, it is possible that the difference between the two mean grades could be zero (meaning no difference in grade between the two groups) or negative (meaning the non-SI participants earned a higher mean final course grade than the SI participants).

The "Mean Percentage Difference of D and F final course grades and course withdrawals" between SI and Non-SI participants is the second of the four SI program outcome variables. The Mean Percentage Difference shows the difference in final course grades of D or F and course withdrawals between students who either did or did not participate in the voluntary SI academic assistance program that is offered in specific courses at each institution. When studying the national data base for SI participants, the data shows that the mean percentage of D and F final course grades and course withdrawals for SI participants are approximately one-half the rate than for non-SI participants, controlling for ethnicity, previous level of academic achievement, and/or motivation to attend voluntary SI academic assistance sessions. The respondent to the SIPQ will subtract the mean percentage rate of SI participants from the mean percentage rate for SI participants. This is estimated to be a positive number since SI participants usually earn lower rates of D and F final course grades and course withdrawals. Lower positive numbers suggest that the SI program has been effective in helping students achieve higher final course grades than the non-SI participants. However, it is possible that the difference between the two mean percentages could be zero (meaning no difference in rate between the two groups) or negative (meaning the non-SI participants earned a lower percentage of D, F and W grades than the SI participants).

The third dependent variable was the "SI Participation Rate." This is the percent of students who self-select to voluntarily participate in the SI academic assistance sessions in the SI Program is the second SI program outcome variable. When studying the national data base for all SI programs, the data shows that about one-third to one-half of students elect to participate in SI academic assistance sessions when these sessions are made available in the class in which they are enrolled. The respondent to the SIPQ would calculate a number between zero and 100 that represented the percent of students who participated at least once during the academic term with the SI sessions in the courses in which the SI program was offered. The respondent would divide the number of students who participated at least once in SI by the total number of students who were enrolled in all the courses in which SI was offered. Due to lack of staff and research support, most SI programs at postsecondary institutions in the United States lack the ability to easily provide academic achievement data (i.e., final course grade in classes where SI was offered to all students) segmented by SI participation rate zones (i.e., attended one to four sessions, attended five to nine sessions, etc.). Consequently, participation in SI is defined as attending one or more times.

Since a definition of SI participant is required, for this study of SI programs outside the University of Missouri-Kansas City, a SI participant is defined as someone who participates in one or more SI sessions during an academic term. There is not an assumption that attendance at a single SI session might affect performance. Rather, SI was originally designed to counter the tendency of students to withdraw from specific courses after the first six weeks of class, a time that generally corresponds to the first midterm examination. The SI program was originally designed to reduce the number of such withdrawals, which is included in the definition of "unsuccessful enrollment" (i.e., final course grades of D or F and course withdrawal). Setting a threshold of attending 3, 5, or more sessions as the minimum to achieve "SI status" would effectively assign all withdrawals who attended fewer SI sessions to the Non-SI group and would substantially (and probably erroneously) magnify the difference in persistence between SI and Non-SI groups. The determination was made, therefore, that a student who withdrew from a class and had attended even a single SI session would be counted among the SI group. This provides a conservative definition of SI membership.

The professional literature suggests that the learning assistance program is more highly rated when it serves many students in comparison with the number of potential students who could be served by the service. Historically, the SI program at UMKC has attracted between one-third to one-half of the students enrolled in classes where the SI program was offered.

The final SI program outcome variable was the "Satisfaction Level" of the SI program administrator with the SI program. The SI program is tailored to meet the educational needs of each institution where it is implemented. Since the SI program is established to meet institutional needs, SI programs at some institutions are quite large while programs at other institutions are much smaller. This variable seeks to discover the satisfaction level of the SI program administrator regarding whether their program had reached its optimal operating level. The respondent to the SIPQ would select a number on a Likert scale to rate their Satisfaction Level.

Hypotheses

This investigation of Supplemental Instruction programs at the University of Missouri-Kansas City and at other postsecondary institutions in the United States will test the following null hypotheses.

1. There is not a statistically significant relationship between participation in SI and higher academic achievement at the University of Missouri-Kansas City. Academic achievement for SI participants is compared with non-SI participants in the course that provided SI sessions. Comparative academic achievement measures would include mean final course grade, rate of A and B final course grades, rate of D and F final course grades and course withdrawals, rate of course withdrawals, and rate of reenrollment at the University two academic semesters after the completion of the course that offered SI.

a. There is not a statistically significant relationship between the rate of attendance at SI sessions and the final course grade for SI participants in the classes that provided SI sessions.

b. There is not a statistically significant relationship between the number of academic terms that the SI leader has served in that role and participation rates in SI sessions and final course grades in the classes that provided SI sessions.

c. There is not a statistically significant relationship between the demographic variables of the students (ethnicity and race, gender, age, student classification) and their participation rates in SI sessions and final course grades in the classes that provided SI sessions.

d. There is not a statistically significant relationship between the previous levels of academic achievement (i.e., high school graduation rank percentile, achievement on standardized college entrance examinations, first exam score in class that offers SI) and their participation rates in SI sessions and final course grades in the classes that provided SI sessions.

e. There is not a statistically significant relationship between the initial motivation of students to attend SI sessions and their participation rates in SI sessions and final course grades in the classes that provided SI sessions.

2. There is not a statistically significant relationship between administrative placement of SI [Academic Affairs, Student Affairs, Administrative Affairs, joint reporting to two or more units, Enrollment Management, or other] with higher academic achievement of SI participants in comparison with Non-SI participants and satisfaction ratings with the SI program by the campus SI Supervisor at postsecondary institutions in the United States.

a. There is not a statistically significant relationship of the mean final course grade difference between SI and Non-SI participants in classes that offered SI and the administrative placement of SI at the institution.

b. There is not a statistically significant relationship of the percentage of D and F final course grades and course withdrawals between SI and Non-SI participants in classes that offered SI and the administrative placement of SI at the institution.

c. There is not a statistically significant relationship of the mean SI participation rate of students in classes that offered SI and the administrative placement of SI at the institution.

d. There is not a statistically significant relationship of the satisfaction level of the SI program administrator regarding the SI program and the administrative placement of SI at the institution.

e. There is not a statistically significant relationship of the length of time that the SI program has been in existence and the administrative placement of SI at the institution.

3. There is not a statistically significant relationship between the fidelity by which the institution implements SI program activity constructs and the effectiveness of the SI program in terms of its helping students who participate in SI regarding academic achievement and satisfaction ratings by the college administrator who supervise the program.

a. There is not a statistically significant relationship between involvement by the campus SI Supervisor (frequency of SI program evaluation, frequency of supervision of first-time SI Leaders, frequency of supervision of experienced SI Leaders, and SI Supervisor knowledge of the SI model) and academic achievement for SI participants and satisfaction ratings by the campus administrator who supervises the program.

b. There is not a statistically significant relationship between SI Leader involvement (frequency of SI Leader class attendance, frequency of using recommended SI session activities, implementation of SI early in academic term, and frequency of offering SI sessions each week) and academic achievement for SI participants and satisfaction ratings by the campus administrator who supervises the program.

c. There is not a statistically significant relationship between SI Leader training (training provided before academic term, training provided during academic term, and use of UMKC SI Leader training materials) and academic achievement for SI participants and satisfaction ratings by the campus administrator who supervises the program.

d. There is not a statistically significant relationship between institutional involvement with the SI program (involvement by the faculty member with the SI program in their class) and academic achievement for SI participants and satisfaction ratings by the campus administrator who supervises the program.

4. There is not a statistically significant relationship between the fidelity by which the institution implements discrete SI program elements and the whether the SI program is active or has been discontinued.

a. There is not a statistically significant relationship between involvement by the campus SI Supervisor (frequency of SI program evaluation, frequency of supervision of first-time SI Leaders, frequency of supervision of experienced SI

Leaders, and SI Supervisor knowledge of the SI model) and the active or discontinued status of the SI program.

b. There is not a statistically significant relationship between SI Leader involvement (frequency of SI Leader class attendance, frequency of using recommended SI session activities, implementation of SI early in academic term, and frequency of offering SI sessions each week) and the active or discontinued status of the SI program.

c. There is not a statistically significant relationship between SI Leader training (training provided before academic term, training provided during academic term, and use of UMKC SI Leader training materials) and the active or discontinued status of the SI program.

d. There is not a statistically significant relationship between institutional involvement with the SI program (involvement by the faculty member with the SI program in their class) and the active or discontinued status of the SI program.

Subjects

Study #1: Analysis of the SI Program at UMKC

The subjects for this study will be all 128 students enrolled in General Chemistry I (CHEM 211) during Fall 1998 at UMKC. Official enrollment in the class includes all students who are officially enrolled in the class after the initial two weeks of the academic term during which students may withdraw from the class without a notation of withdrawal upon their official University transcript.

Study#2: Analysis of SI Programs in the U.S.

There will be two subjects in Study #2. The first is the SI program administrator at another postsecondary institution in the United States that has received official training by staff from the SI training center at the UMKC to implement a SI program on their home campus. The SI program administrator is often equivalent to a department chair or a director. The second subject is the institution itself. While it will be the SI program administrator who completes the questionnaire regarding the SI program, the subject for this instrument is the institution itself.

All known United States post-secondary institutions that have sent faculty or staff to UMKC to receive training to start their own SI program will be offered participation in the study. This will form a population of approximately 735 institutions. Two-thirds of the institutions are four-year institutions and one-third are two-year. Three-fourths of the institutions are public, and the remaining one-fourth are private. The mean institutional size is 10,654 full-time equivalent students. The addresses for these individuals is maintained in a computer database at the National SI Project Office at The University of Missouri-Kansas City. It is anticipated that of the 735 SI program administrators who receive the questionnaire packet, half of them will complete the packet and return it to the researcher.

Procedures

Study #1: Analysis of the SI Program at UMKC

Data regarding students enrolled in General Chemistry I will be collected from the UMKC campus SI Supervisor and from the Director of Research for the Division of Student Affairs. It will be necessary to merge various data sets to create one comprehensive data file that will be analyzed using SPSS statistical analysis software.

Study #2: Analysis of SI Programs in the U.S.

The list of faculty and staff from the 735 institutions who received training by SI staff was obtained from the National Center for SI at The University of Missouri-Kansas City. Each of these individuals received a packet containing: a cover letter from the researcher and a copy of the SIPQ. It was anticipated that it required approximately thirty minutes for the SI program administrator to complete the SIPQ. Then the same person returned the questionnaire to the researcher.

The subjects who did not return the completed packets within three weeks of the due date received a reminder card from the researcher encouraging them to complete the packet and return it within one week. For those subjects who did not return the completed packet within six weeks of the original due date received a personal telephone call from the researcher encouraging them to complete the packet and return it within one week. The completed questionnaire packets were returned by 380 administrators.

The letter that accompanied the packet contained the following admonitions: "It is important that you fill out this questionnaire within the next seven days in the most honest manner you can. The results will be used to help new and old SI Programs decide the best administrative location for their program and the most essential SI program practices. It should take approximately thirty minutes to complete the questionnaire. The results will only be reported in aggregate."

Data Analysis

Study #1: Analysis of the SI Program at UMKC

The Nonequivalent Control Group Design (Campbell & Stanley, 1963) was selected for the quantitative analysis for the SI data. This quasi-experimental design controls for the main effects of history, maturation, testing, and instrumentation. Special caution was taken to deal with possible threats to this design. These included student motivation, students who withdraw from the course, and the possible interference by other academic support services. The lack of random assignment was monitored by careful attention to the pretest attributes of the SI and Non-SI participants.

The data would be analyzed in three phases: equivalency of the control (Non-SI) and treatment (SI) groups; final course grades in the General Chemistry I course; and reenrollment status of students in a subsequent academic term.

The first phase of analysis would be to determine if students enrolled in General Chemistry I during Fall 1998 who were in either the control group (Non-SI participants) and treatment group (SI participants) were equivalent regarding several dependent variables. Cross-Tabs and Chi-Square analysis would be applied with the following categorical variables: student classification (e.g., first-year, sophomore), gender, ethnicity/race, and initial motivation to attend SI sessions during the academic term in the General Chemistry I class. Categorical data warranted analysis through Chi-Square. Independent T-Tests analysis would be applied with the following continuous variables: ACT composite score, high school graduation rank percentile, and age of the student when enrolled in the General Chemistry I class. Independent T-Test analysis was used when comparing SI and Non-SI participants and interval data was available.

The second phase of analysis of the data would be to study the potential relationship between the SI (treatment) and Non-SI (control) groups and final course grades or course withdrawals in the General Chemistry I class. Initially Cross-Tabs, Chi-Square, and Independent T-Test analysis would be used. Following that, multiple regression analysis would be employed to explore the potential relationship of individual independent variables and final course grades. Then hierarchical regression analysis would be used with the independent variable constructs (demographics, previous levels of academic achievement, SI attendance in the class) and final course grades.

The final phase of analysis of the data would be to study the potential relationship between the SI (treatment) and Non-SI (control) groups in the General Chemistry I class during Fall 1998 and reenrollment status. Initially Cross-Tabs, Chi-Square, and Independent T-Test analysis would be used. Following that, multiple regression analysis would be employed to explore the potential relationship of individual independent variables and final course grades. Then hierarchical regression analysis would be used with the independent variable constructs (demographics, previous levels of academic achievement, SI attendance in the class) and final course grades.

Study #2: Analysis of SI Programs Located in the U.S.

Fidelity of SI implementation was monitored through procedures designed by King, Morris, and Fitz-Gibbon (1987). Two critical areas identified by these researchers: (1) the setting and context in which the program occurs; and (2) specific program activities. This supports the collection of information about the SI setting such as its administrative placement within the institution and other information about the SI program that might have an impact on it. Critical program activities were identified through the SI professional literature and key people involved with the SI program.

The research questions would be investigated through six phases of analysis. The first phase would be an alpha analysis of the reliability of the survey instrument that was used to collect many dependent and independent variables. The second phase would be an analysis of the variance between categorical independent variable of administrative placement of the SI program (academic affairs, student affairs, joint reporting to academic and student affairs, enrollment management, other) and the four dependent SI program outcome variables (mean grade difference, mean percentage of D, F and W final course grades, SI participation Rates and SI satisfaction level by the campus SI Supervisor). The next would be Cross-Tabs and Chi-Square analysis of the relationship between administrative placement of the SI program and the length of time that the SI program had existed. Following this, a multiple regression analysis would be conducted among the SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) and the length of time that the SI program had existed. The fifth phase would be a multiple regression analysis among the SI program outcomes and the length of time that the SI program had existed. The sixth and final phase would be a multiple regression analysis among the SI program activity constructs and the SI program outcomes.

If there are relationships suggested by the data, additional hierarchical regression analysis would be conducted to discover which of the SI program activity constructs were the most significant predictors of the dependent SI program variables. For those SI program activity constructs that are statistically significant, additional analysis would be conducted using multiple regression to identify individual items within the construct that contributed to the prediction.

Expected Results

1. It is expected that there will be a correlation with statistically significant results between participation in SI and the following student academic outcomes: higher mean final course grades; higher rates of A and B final course grades; lower rates of D, F, and course withdrawals; lower rates of course withdrawals; and higher rates of reenrollment at UMKC academic terms after participating in SI.

2. It is expected that there will be a high correlation with statistically significant results between administrative placement of the SI program within the institution and the four criterion variables of Mean Grade Difference, Mean Percentage Difference of D, F

and W Final Course Grades, SI Participation Rate, and SI Satisfaction Level by the campus administrator who supervises the program. This data may reveal that SI programs under one of the administrative placement locations will have: higher mean final course grade differences between SI and non-SI participants; larger mean percentages of students participating in SI; and high mean SI program level of satisfaction as expressed by the SI program administrator. Due to a lack of any significant research in the profession, it is difficult to estimate which administrative placement will be found to have higher correlation relationships.

3. It is expected that there will be positive statistically significant correlations between one or more of the four SI program activity constructs and the four criterion variables of Mean Grade Difference, Mean Percentage Difference of D, F and W Final Course Grades, SI Participation Rate and SI Satisfaction Level.

4. It is expected that there will be positive statistically significant correlations between one or more of the four SI program activity constructs and the status of the SI program (active or discontinued).

Summary

This research methodology will test the assumptions stated during the previous chapter: SI participation increases student academic performance; SI participation increases persistence rates; and SI program effectiveness is increased through implementation of all SI program elements. In addition, new information will be gathered regarding the potential correlation among the SI program activity constructs and the dependent variables. This will provide an opportunity to examine the key components of the SI program and discover the degree to which they are correlated with higher program outcomes. This will be valuable information for professionals in the field as they implement the SI program or use components of it for improved academic achievement of students.

CHAPTER 4

RESULTS

Introduction

Two purposes guided this research. The first was to investigate factors that may have had a direct or indirect influence upon the effectiveness of the Supplemental Instruction (SI) program to improve the academic performance of students that participate in the program (higher mean final course grades in the classes in which they received academic assistance, lower rates of withdrawals, higher rates of persistence at the institution). The second purpose of this research was to identify specific practices that improved the effectiveness of the SI program and resulted in higher academic achievement for SI participating students and higher levels of satisfaction with the program by the campus SI coordinator.

Study #1 focused on the SI program at the University of Missouri-Kansas City (UMKC). The independent variables of UMKC students included: (1) demographic variables such as gender, age, ethnicity/race, motivation; (2) measures of precollegiate academic achievement, and (3) rate of participation in the SI program. The dependent variables were student grade achievement in the course that has SI assistance provided for it and the persistence toward graduation of these students.

Study #2 focused on the SI program at 735 postsecondary institutions in the United States that received SI supervisory training from UMKC. The major independent variables were administrative placement of the unit (academic affairs, student affairs, or other), length of time that the SI program had been in existence, and fidelity of the program regarding a set of SI program-related activity constructs. The dependent variables were student grade achievement and satisfaction level of the campus SI coordinator with the SI program.

Analysis to be Used

Study #1: Analysis of the SI Program at UMKC

The Nonequivalent Control Group Design (Campbell & Stanley, 1963) was selected for the quantitative analysis for the SI data. This quasi-experimental design controlled for the main effects of history, maturation, testing, and instrumentation. Special caution was taken to deal with possible threats to this design. These included student motivation, students who withdraw from the course, and the possible interference by other academic support services. The lack of random assignment was monitored by careful attention to the pretest attributes of the SI and Non-SI participants.

The data was analyzed in three phases: equivalency of the control (Non-SI) and treatment (SI) groups; final course grades in the General Chemistry I course; and reenrollment status of students in a subsequent academic term.

The first phase of analysis examined students enrolled in General Chemistry I during Fall 1998 who were in either the control group (Non-SI participants) and the treatment group (SI participants) were equivalent regarding several dependent variables. Chi-Square analysis was applied with the following categorical variables: student classification (e.g., first-year, sophomore), gender, ethnicity/race, and initial motivation to attend SI sessions during the academic term in the General Chemistry I class. Independent t-tests analysis were applied with the following continuous variables: ACT composite score, high school graduation rank percentile, and age of the student when enrolled in the General Chemistry I class.

All independent variables in the previous analysis were included in the analysis that follow except one variable, initial motivation of students in the class to participate in the SI program. While there was no statistical difference between SI and Non-SI students regarding interest in attending SI sessions, the survey question that gathered this data was only completed by 26 of the 128 students in the General Chemistry I class. Inclusion of this variable in the equation for further analysis would have seriously hampered the regression analysis due to the high number of missing cases. Therefore, it was excluded from additional analysis.

The second phase of analysis of the data was to study the potential relationship between the SI (treatment) and Non-SI (control) groups and final course grades or course withdrawals in the General Chemistry I class. Initially Chi-Square and Independent t-test analysis were used. Following that, multiple regression analysis was employed to explore the potential relationship of independent variables and final course grades. Then hierarchical regression analysis was used with the independent variable constructs (demographics, previous levels of precollegiate academic achievement, SI attendance in the class) and final course grades.

The final phase of analysis of the data was to study the potential relationship between the SI (treatment) and Non-SI (control) groups in the General Chemistry I class during Fall 1998 and reenrollment status. Initially Chi-Square and Independent t-test analysis were used. Following that, multiple regression analysis was employed to explore the potential relationship of individual independent variables and final course grades. Then hierarchical regression analysis was used with the independent variable constructs (demographics, previous levels of precollegiate academic achievement, SI attendance in the class) and final course grades.

Study #2: Analysis of SI Programs in the U.S.

Fidelity of SI implementation was monitored through procedures designed by King, Morris, and Fitz-Gibbon (1987). Two critical areas were identified by these researchers: (1) the setting and context in which the program occurs; and (2) specific program activities. This supported collection of information about the SI setting such as its administrative placement within the institution and other information about the SI program that might have an impact on it. Critical program activities were identified through the SI professional literature and key people involved with the SI program.

The research questions was investigated through six phases of analysis. The first phase was an analysis of the reliability of the survey instrument used to collect many dependent and independent variables. The second phase was an analysis of variance between categorical independent variable of administrative placement of the SI program (academic affairs, student affairs, joint reporting to academic and student affairs, enrollment management, other) and the four dependent SI program outcome variables (mean grade difference, mean percentage of D, F and W final course grades, SI participation Rates and SI satisfaction level by the campus SI Supervisor). The next was Chi-Square analysis of the relationship between administrative placement of the SI program and the length of time that the SI program had existed. Following this, a multiple regression analysis was conducted among the SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) and the length of time that the SI program had existed. The fifth phase was a multiple regression analysis between the SI program outcomes and the length of time that the SI program had existed. The sixth and final phase was a multiple regression analysis among the SI program activity constructs and the SI program outcomes.

Relationships suggested by the data were analyzed by additional hierarchical regression analysis to discover which of the SI program activity constructs were the most significant predictors of the dependent SI program variables. For those SI program activity constructs that are statistically significant, additional analysis were be conducted using multiple regression to identify individual items within the construct that contributed to the prediction.

Study #1: UMKC Campus SI Program

Hypothesis 1. There is not a statistically significant relationship between participation in SI and higher academic achievement at the University of Missouri-Kansas City. Comparative academic achievement measures would include mean final course grade, rate of A and B final course grades, rate of D and F final course grades and course withdrawals, rate of course withdrawals, and rate of reenrollment at the University for two academic semesters after the completion of the course that offered SI.

Comparison of the SI and Non-SI Participants in General Chemistry I, Fall 1998

Before conducting an analysis of dependent outcomes variables, the SI participants (Treatment Group) and the Non-SI participants (Control Group) were compared to discover if there are statistically significant differences relating to the above noted factors between the two groups. For the following Chi-Square analysis, the variable names received the following designations:

CLASS	Student class (e.g., first-year, sophomore)
GENDER	Male or female
ETHNICITY	Ethnicity or race of the student
MOTIVATION	Initial motivation of the student to attend SI

TABLE 5

RELATIONSHIP OF SI PROGRAM PARTICIPATION AND INDEPENDENT VARIABLES IN GENERAL CHEMISTRY I: CHI-SQUARE ANALYSIS

Independent Variable	Group Composition	Number in Group	Chi Square	Significance
Class	SI	44	5.781	.123
	Non-SI	84		
Gender	SI	44	.332	.564
	Non-SI	84		
Ethnicity	SI	44	4.172	.653
	Non-SI	84		
Motivation	SI	5	1.714	.788
	Non-SI	21		

For the following Independent t-test analysis, the variable names received the following designations:

ACT Score	Composite Score on the ACT standardized examination
HS Rank	High school graduation percentile rank
AGE	Age of the student during Fall 1998

TABLE 6

RELATIONSHIP OF SI PROGRAM PARTICIPATION AND INDEPENDENT VARIABLES IN GENERAL CHEMISTRY I: INDEPENDENT T-TEST ANALYSIS

Independent Variable	Group Composition	Number in Group	Mean Score	Std. Dev.	t	Sig.
ACT Score	SI	40	26.73	3.52	2.320	.445
	Non-SI	65	26.15	3.81		
HS Rank	SI	39	92.59	5.64	26.804	.027*
	Non-SI	60	87.90	12.19		
AGE	SI	44	18.39	1.33	8.950	.068
	Non-SI	83	19.60	4.27		

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

Regarding the independent variables analyzed for the SI and Non-SI groups, there was no statistical significant difference between the two groups except one variable. In that instance, the SI group had a higher mean high school graduation percentile rank that resulted in statistical significance at the $p < .05$ level. The high school graduation rank percentile served as a measure of previous precollegiate academic achievement. However, there was no statistically significant difference between the control and treatment groups regarding the composite score from the ACT standardized college entrance examination. This is another measure of previous precollegiate academic achievement. This presented an inconsistent analysis regarding the difference in levels of previous precollegiate academic achievement between the two groups.

While comparison of standardized examination scores such as the ACT can be made among students at different locations in the U.S. since they have experienced the same assessment instrument, the same cannot be said of comparison regarding high school graduation rank percentile. It cannot be assumed that all high schools employ the same standards of academic performance though they may be in the same state or even same school district. Secondly, the wide difference in class size among high schools may result in inequity among potential comparisons of students. For example, high achieving students in small high schools might be relegated to lower class rank due to a few students scoring higher while in a much larger high school the high performing high school students who receive higher rank due to the greater number of average and below average students.

Relationship of SI Program Participation with Final Course Grade

The students in the General Chemistry I class were analyzed regarding the relationship between whether or not they participated in SI and their final course grade for that class. The data was analyzed using Chi-Square and Independent t-test in the following three tables. The first table reported results of using Chi Square to analyze each individual final course grade in the class. UMKC professors were permitted to award final course grades that also include plus and minus. In this instance, there were no A-, B-, C-, or D- grades awarded in the class. The table that follows this one used Chi-Square to analyze the data by grouping the final course grades into A and B or D, F, or withdrawal. The final table in the series performs an Independent *t*-test to compare SI and Non-SI participants regarding the final course grade in General Chemistry I.

TABLE 7

RELATIONSHIP OF SI PROGRAM PARTICIPATION AND FINAL COURSE GRADE IN GENERAL CHEMISTRY I: ANALYSIS BY FINAL COURSE GRADES

Final Course Grade General Chemistry I		SI Participant (n = 44)	Non-SI Participant (n = 88)
A	Count Expected Count	14 12.4	22 23.6
B+	Count Expected Count	2 1.0	1 2.0
B	Count Expected Count	12 11.0	20 21.0
C+	Count Expected Count	6 2.4	1 4.6
C	Count Expected Count	6 4.1	6 7.9
D+	Count Expected Count	0 0.7	2 1.3
D	Count Expected Count	3 3.4	7 6.6
F	Count Expected Count	0 6.5	19 12.6
W	Count Expected Count	1 2.4	6 4.6
Total	Count Expected Count	44 44.0	84 84.0

Using Chi-Square analysis of data, there was a significant statistical difference between SI and Non-SI participants regarding final course grades and rates of course withdrawal in the General Chemistry I class. The results of Chi-Square analysis favored the SI participants since it produced a value of 23.665 and a two-sided significance value of .003 that is lower than the threshold of $p < .01$ level. Based on the Chi Square analysis, the SI group exceeded expectation for a higher percentage of students who earned A and B final course grades and concurrently earned a smaller percentage than predicted for the combined rate of D, F, and withdrawals and also a lower rate for withdrawals when evaluated by itself. The results for the Non-SI participants were opposite that of the SI participants: they earned a lower rate of A and B final course grades than predicted and a higher rate of combined D, F, and withdrawal and also a higher rate of withdrawals when evaluated by itself. These results are consistent with those reported in previous research studies (Arendale, 1999).

TABLE 8

RELATIONSHIP OF SI PROGRAM PARTICIPATION AND FINAL COURSE GRADE IN GENERAL CHEMISTRY I: ANALYSIS BY THE COMBINED RATE OF A & B AND THE COMBINED RATE OF D, F, AND W FINAL COURSE GRADES

Final Course Grade General Chemistry I		SI Participant (n = 32)	Non-SI Participant (n = 77)
Combined Rate of A and B	Count Expected Count	28 20.8	43 50.2
Combined Rate of D, F, and Withdrawal	Count Expected Count	4 11.2	34 26.8
Total	Count Expected Count	32 32.0	77 77.0

Using Chi-Square analysis of these data, there was a significant statistical difference between SI and non-SI participants regarding final course grades in the General Chemistry I class. The results of Chi-Square analysis favored the SI participants since it produced a value of 9.975 and a two-sided significance value of .002 that is lower than the threshold of $p<.05$ established earlier in the research design. Based on the Chi Square analysis, the SI group exceeded prediction for the percentage of students earning the combined group of A and B final course grades and failed to reach the predicted percentage of the combined rate of D, F, and course withdrawals. The results for the Non-SI participants were opposite that of the SI participants: they earned a lower rate of the combined group of A and B final course grades than predicted and earned a higher rate than predicted for the percentage of combined D, F, and course withdrawal. These results are consistent with those reported in previous research studies (Arendale, 1999).

TABLE 9

COMPARISON BETWEEN THE SI AND NON-SI PARTICIPANT GROUPS REGARDING MEAN FINAL COURSE GRADE IN GENERAL CHEMISTRY I

	SI Group (n = 43)	Non-SI Group (n = 78)
Mean Final Course Grade	2.963	2.246
Standard Deviation	.9137	1.5668
Std. Error Mean	.1393	.1774
Significance	t (119) = 2.749**	

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

The results of this Independent t-test of mean final course grades shows that there was a significant statistical difference for students who completed the course and were assigned a letter grade, t (119) = 2.749, p < .01. Students who participated in SI earned higher mean final course grades that students who did not participate. These results are consistent with those reported in previous research studies (Arendale, 1999).

While this analysis found statistical significance, more rigorous research was warranted to investigate whether other independent variables might also help to explain the relationship between SI participation and the dependent variables of final course grades and reenrollment rates at the institution in subsequent academic terms. Therefore, a hierarchical linear regression model was selected to provide a more comprehensive analysis of the potential relationships of the independent and dependent variables.

Relationship of the Independent Variables and Final Course Grade in General Chemistry I During Fall 1998

The students enrolled in General Chemistry I during Fall 1998 were analyzed regarding final course grade in the class and the potential relationship with the independent variables through the hierarchical multiple regression model. The dependent variables were added in three successive groups: student demographics (ethnicity/race, gender, age, student classification), previous levels of academic achievement (ACT composite score, high school graduation rank percentile), and SI attendance.

For the following regression analysis, the variable names received the following designations:

GRA	Final course grade in General Chemistry I
ETH	Ethnicity or race of the student
GEN	Male or female
AGE	Age of the student during Fall 1998
CLA	Student class (e.g., first-year, sophomore)
HSR	High school graduation percentile rank
ACT	Composite Score on the ACT standardized examination
ATT	Attended SI during Fall 1998 in General Chemistry I

TABLE 10

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF FINAL COURSE GRADE IN GENERAL CHEMISTRY I AND THE INDEPENDENT VARIABLES

	GRD	ETH	GEN	AGE	CLA	HSR	ACT	ATT
GRD	1.000							
ETH	.025	1.000						
GEN	.002	-.031	1.000					
AGE	-.053	.002	.012	1.000				
CLA	-.047	-.019	.014	.607**	1.000			
HSR	.625**	-.025	.081	-.095	-.114	1.000		
ACT	.567**	-.263**	-.055	-.263**	-.249**	.496**	1.000	
ATT	.231**	-.118	.221**	-.102	-.099	.066	.040	1.000

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

The multiple regression analysis showed that the response variable of final course grade in General Chemistry I was related to several independent variables at the statistically significant level of $p < .01$ level: high school graduation percentile rank, ACT composite score, and the rate of attendance in SI sessions for the General Chemistry I class. Students were predicted to earn higher final course grades based on both higher rates of SI attendance and on higher precollegiate academic achievement. This is similar to other research studies who have studied the same variables (Arendale, 1999). Additional analysis was warranted to examine the relationship of the three constructs of independent variables: student demographics, previous levels of precollegiate academic achievement, and rate of SI attendance in the General Chemistry I course during Fall 1998.

There were other relationships not involving final course grade in General Chemistry I reported in this analysis. ACT composite score was correlated with the following: ethnicity (favoring the entire group of non-Caucasian subpopulations); student age at the time of enrollment in the General Chemistry I class (favoring students of younger age); student classification (favoring students of lower classification such as first year); and high school grade percentile rank (favoring students of higher high school graduation rank percentile). Student classification was naturally correlated with age of the student (upper clansmen were older chronically). The rate of attendance with SI sessions during the academic term was correlated with gender (favoring males).

TABLE 11

REGRESSION ANALYSIS OF FINAL COURSE GRADE IN GENERAL CHEMISTRY I AND THE THREE MODELS OF INDEPENDENT VARIABLES

Regression Model	R	R Square	Adjusted R Square	F Value	Sig F
Model 1	.061	.004	-.042	.081	.988
Model 2	.713	.508	.473	14.638	.000**
Model 3	.748	.560	.523	15.246	.000**

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

Model 1 = Student Demographics
Model 2 = Student Demographics + Previous Academic Achievement
Model 3 = Student Demographics + Previous Academic Achievement + SI Attendance

A hierarchical regression analysis between the response variable of final course grade in General Chemistry I and the three independent variable constructs found that two of them were statistically significant at the $p < .01$ level: Previous precollegiate academic achievement and SI attendance.

TABLE 12

STANDARDIZED REGRESSION COEFFICIENTS FOR THREE ADDITIVE MODELS FOR ANALYSIS OF FINAL COURSE GRADE IN GENERAL CHEMISTRY I

Regression Model	Beta	*t*	Sig.
Model 1: Student Demographics			
ETH	.025	.231	.818
GEN	.004	.037	.971
AGE	-.039	-.290	.773
CLA	-.166	-.166	.868
Model 2: Student Demographics + Precollegiate Academic Achievement			
ETH	.148	1.854	.067
GEN	-.007	-.085	.933
AGE	.050	.521	.604
CLA	.081	.836	.406
HSR	.433	4.856	.000**
ACT	.424	4.417	.000**
Model 3: Student Demographics + Precollegiate Academic Achievement + SI Attendance			
ETH	.177	2.309	.023*
GEN	-.057	-.757	.451
AGE	.067	.724	.471
CLA	.096	1.045	.299
HSR	.421	4.953	.000**
ACT	.434	4.742	.000**
ATT	.236	3.131	.002**

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level. The variable names received the following designations: ETH=Ethnicity or race of the student; GEN=Male or female; AGE=Age of the student during Fall 1998; CLA= Student class (e.g., first-year, sophomore); HSR=High school graduation percentile rank; ACT=Composite Score on the ACT standardized examination; ATT=Attended SI during Fall 1998 in General Chemistry I

Analysis of the Beta coefficients found that two of the three independent variable constructs were statistically significant at the $p < .01$ level: Previous precollegiate academic achievement and SI attendance. These two constructs had medium effect sizes. The precollegiate variables had a stronger influence on course grade, but SI attendance also was a significant contributor. While ethnicity/race was not statistically significant in Model 1, it reached significance at the $p < .05$ level in Model 3. This is a spurious result since it is inconsistent with previous analysis of this data which found no relationship.

Relationship of SI Attendance and Reenrollment During Fall 1999

All students who were enrolled in General Chemistry I during Fall 1998 were followed to examine their reenrollment status during Fall 1999. The data was analyzed using Chi-Square. Recognizing that some Non-SI participants during Fall 1998 might have participated in SI during Winter 1999, three subpopulations of students were created from all those enrolled in General Chemistry I during Fall 1998: participated in SI during Fall 1998 or Winter 1999; participated in SI during both Fall 1998 and Winter 1999; did not participate in SI during either Fall 1998 or Winter 1999.

TABLE 13

RELATIONSHIP OF SI ATTENDANCE DURING ACADEMIC TERMS AND REENROLLMENT AT UMKC DURING FALL 1999

SI Attendance Status		Not Enrolled Fall 1999 (n = 34)	Enrolled Fall 1999 (n = 94)
Attended SI Both Academic Terms	Count Expected Count	2 5.0	17 14.0
Attended SI Either Fall 1998 or Winter 1999	Count Expected Count	6 10.4	33 28.6
Never Attended SI Either of the Academic Terms	Count Expected Count	26 18.6	44 51.4
Total	Count Expected Count	34 34.0	94 94.0

Using Chi-Square analysis of the data, there was a significant statistical relationship between an increasing number of academic terms of SI attendance by a student and the reenrollment status of the student for Fall 1999. The Chi Square analysis produced a value of 9.02 and a two-sided significance value of .011 that exceeded the $\underline{p} < .05$ level. While other studies have found a positive statistical relationship between SI attendance in a course and persistence at the institution, there are no other research studies to compare these findings that examined the cumulative impact of SI attendance in succeeding academic terms with increased persistence at the institution (Arendale, 1999).

The students enrolled in General Chemistry I were analyzed regarding reenrollment during Fall 1999 for the potential relationship with the independent variables using the hierarchical regression model. The dependent variables were added in three successive groups: student demographics (ethnicity/race, gender, age, student classification), previous levels of precollegiate academic achievement (ACT composite score, high school graduation rank percentile), and SI attendance. `For the following hierarchical regression analysis, the variable names received the following designations:

REN	Fall 1998 Chem 211 student reenrollment status during Fall 1999
ETH	Ethnicity or race of the student
GEN	Male or female
AGE	Age of the student during Fall 1998
CLA	Student class (e.g., first-year, sophomore)
HSR	High school graduation percentile rank
ACT	Composite Score on the ACT standardized examination
ATT	Attended SI during Fall 1998 in General Chemistry I

TABLE 14

CORRELATION MATRIX FOR RESPONSE VARIABLE OF REENROLLMENT STATUS DURING FALL 1999 AND THE INDEPENDENT VARIABLES

	REN	ETH	GEN	AGE	CLA	HSR	ACT	ATT
REN	1.000							
ETH	.211*	1.000						
GEN	-.114	-.031	1.000					
AGE	-.184*	.006	.011	1.000				
CLA	-.156	-.015	.013	.608*	1.000			
HSR	.403**	-.011	.111	-.086	-.103	1.000		
ACT	.273**	-.234*	-.060	-.246*	-.231*	.494**	1.000	
ATT	-.232*	.024	-.114	.069	.126	-.226*	.007	1.000

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

Correlation analysis showed that the response variable of reenrollment at UMKC during Fall 1999 was related to several independent variables: higher level of high school graduation percentile rank (p <.01), higher ACT composite score (p <.01), younger age of the student (p < .05), non-Caucasian ethnicity/race (p < .05), and higher level of SI session attendance for more than one academic term (none, one academic term, two academic terms) (p < .05). This is similar to other research studies who have studied similar variables (Arendale, 1999).

Additional analysis was warranted to examine the relationship of the three constructs of independent variables: student demographics, previous levels of academic achievement, and level of SI attendance with reenrollment during Fall 1999.

TABLE 15

REGRESSION ANALYSIS OF REENROLLMENT DURING FALL 1999 AND THE THREE MODELS OF INDEPENDENT VARIABLES

Regression Model	R	R Square	Adjusted R Square	F	Sig F
Model 1	.304	.092	.052	2.293	.066
Model 2	.513	.263	.213	5.235	.000**
Model 3	.541	.293	.236	5.145	.059

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

Model 1 = Student Demographics
Model 2 = Student Demographics + Previous Academic Achievement
Model 3 = Student Demographics + Previous Academic Achievement + SI Attendance

A regression analysis between the response variable of reenrollment during Fall 1999 and the three independent variable constructs found that one was statistically significant: Previous Precollegiate Academic Achievement ($p < .01$). The addition of SI Attendance was nearly statistically significant at the $p < .05$ level. Based on previous analysis of the independent variables, it was discovered that the variable of high school graduation rank percentile was higher for the SI group in comparison with the Non-SI group. Since the two variables of high school graduation rank percentile and SI attendance covaried together, depending upon which variable was entered first into the regression model, the actual contribution of the second variable would be partially hidden by the first.

TABLE 16
STANDARDIZED REGRESSION COEFFICIENTS FOR THREE ADDITIVE MODELS FOR ANALYSIS OF REENROLLMENT DURING FALL 1999

Regression Model	Beta	t	Sig.
Model 1: Student Demographics			
ETH	.207	2.062	.042*
GEN	-.105	-1.049	.297
AGE	-.146	-1.155	.251
CLA	-.063	-.497	.620
Model 2: Student Demographics + Precollegiate Academic Achievement			
ETH	.237	2.486	.015*
GEN	-.138	-1.481	.142
AGE	-.115	-.988	.326
CLA	-.158	-1.158	.875
HSR	.354	3.281	.001**
ACT	.113	.989	.326
Model 3: Student Demographics + Precollegiate Academic Achievement + SI Attendance			
ETH	.249	2.649	.010**
GEN	-.150	-1.633	.106
AGE	-.113	-.988	.326
CLA	.007	.058	.954
HSR	.299	2.714	.008**
ACT	.150	1.311	.193
ATT	-.181	-1.912	.059

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level. The variable names received the following designations: ETH=Ethnicity or race of the student; GEN=Male or female; AGE=Age of the student during Fall 1998; CLA= Student class (e.g., first-year, sophomore); HSR=High school graduation percentile rank; ACT=Composite Score on the ACT standardized examination; ATT=Attended SI during Fall 1998 in General Chemistry I

Analysis of the Beta coefficients found that one was statistically significant at the $p < .01$ level: high school graduation rank percentile and one at the $p < .05$ level: ethnicity/race. International students, who traditionally had the highest rates of persistence at the institution, were included as part of the non-Caucasian ethnic/racial group. This contributed to influence of this variable on increased persistence at the institution. Attendance at SI sessions was nearly significant ($p < .059$). The three constructs had small effect sizes. The precollegiate variables had a stronger influence on course grade, but SI attendance nearly was also a significant contributor.

To investigate the potential contribution of SI attendance to the hierarchical regression model, the variables that composed the construct of previous precollegiate academic achievement (high school graduation rank percentile and ACT composite score) were eliminated from the equation. The dependent variables were added in two successive groups: student demographics (ethnicity/race, gender, age, student classification) and SI attendance.

For the following hierarchical regression analysis, the variable names received the following designations:

REN	Final course grade in General Chemistry I
ETH	Ethnicity or race of the student
GEN	Male or female
AGE	Age of the student during Fall 1998
CLA	Student class (e.g., first-year, sophomore)
ATT	Attended SI during Fall 1998 in General Chemistry I

TABLE 17

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF FINAL COURSE GRADE IN GENERAL CHEMISTRY I AND THE INDEPENDENT VARIABLES

	REN	ETH	GEN	AGE	CLA	ATT
REN	1.000					
ETH	.169*	1.000				
GEN	-.215**	-.140	1.000			
AGE	-.154*	-.044	-.070	1.000		
CLA	-.255**	-.063	.071	.760*	1.000	
ATT	-.257**	.081	-.047	.153	.243**	1.000

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

Correlational analysis showed that the response variable of reenrollment during Fall 1999 was related to several independent variables at the $p < .01$ level (gender favoring males, younger age of students during Fall 1998, lower class standing as a first-year student, and higher levels of SI attendance) and at the $p < .05$ level for ethnicity (higher for non-Caucasian ethnic/racial groups as a whole). Some of these findings are similar to other research studies who have studied similar variables (Arendale, 1999). Additional analysis was warranted to examine the relationship of the two constructs of independent variables: student demographics and rate of SI attendance in the Fall 1998 and Winter 1999 academic terms.

TABLE 18

REGRESSION ANALYSIS OF REENROLLMENT RATE DURING FALL 1999 AND THE TWO MODELS OF INDEPENDENT VARIABLES

Regression Model	R	R Square	Adjusted R Square	F	Sig. F
Model 1	.348	.121	.092	4.191	.003**
Model 2	.415	.172	.138	5.026	.007**

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level
Model 1 = Student Demographics
Model 2 = Student Demographics + SI Attendance

A regression analysis between the response variable of reenrollment rate during Fall 1999 of students who were enrolled in General Chemistry I the previous year and the two independent variable constructs found that both two of them were statistically significant at the $p < .01$ level: Student Demographics and SI Attendance.

TABLE 19

STANDARDIZED REGRESSION COEFFICIENTS FOR TWO ADDITIVE MODELS FOR ANALYSIS OF REENROLLMENT DURING FALL 1999

Regression Model	Beta	t	Sig.
Model 1: Student Demographics			
ETH	.129	1.506	.135
GEN	-.175	-1.997	.048**
AGE	.042	.316	.753
CLA	-.266	-2.003	.047**
Model 2: Student Demographics + SI Attendance			
ETH	.150	1.785	.077
GEN	-.190	-2.220	.028**
AGE	.020	.154	.878
CLA	-.190	-1.435	.154
ATT	-.235	-2.734	.007*

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level. The variable names received the following designations: ETH=Ethnicity or race of the student; GEN=Male or female; AGE=Age of the student during Fall 1998; CLA= Student class (e.g., first-year, sophomore); ATT=Attended SI during Fall 1998 in General Chemistry I

Analysis of the Beta coefficients found that one was statistically significant at the $p < .01$ level: SI attendance and two variables were significant at the $p < .05$ level): gender and student class standing. Females and upper classmen were more likely to persist than others. The two constructs had small effect sizes. SI attendance had a stronger influence on reenrollment, but gender and student class standing were also significant contributors.

Study #2: National SI Programs

Reliability of Survey Instrument

The independent and dependent variables were obtained from the SI Program Questionnaire (SIPQ). The SIPQ, designed by the researcher, provided fourteen independent (collapsed into the four SI activity constructs of SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) and four dependent variables (mean final course grade, mean percent D, F and W final course grade, percent of students participating in SI, and the satisfaction rating of the SI program by the campus administrator in charge of the program).

The face validity of the SIPQ was established through a panel review of appropriate experts in the fields of academic and student affairs before its administration. This panel included the original creator of the SI model (Deanna C. Martin), National SI Staff at UMKC, Certified SI Trainers, and directors of several SI programs in the U.S. The statistical test of reliability of the SIPQ (survey questions 19 through 31) revealed an alpha = .603.

TABLE 20

RELIABILITY ANALYSIS OF SI SURVEY: SI PROGRAM ACTIVITIES

Survey Item Number	Mean Score	Standard Deviation	Alpha if Item Deleted from Analysis
Q #19	4.4765	.8806	.5627
Q #20	3.7013	.9255	.5399
Q #21	2.7349	1.3951	.6019
Q #22	3.7718	1.2206	.5477
Q #23	2.5839	1.0579	.5402
Q #24	2.1913	.9358	.5469
Q #25	4.6946	.7229	.5879
Q #26	3.8154	.6688	.6042
Q #27	3.1242	.6626	.6245
Q # 28	5.0638	1.2550	.6181
Q # 29	3.7383	.9093	.6120
Q # 30	4.2416	.5991	.5970
Q # 31	2.5201	.7574	.5811
Total	46.6577	5.1604	.6030

N of Cases = 298

This analysis of the SIPQ instrument found only moderate reliability. Most researchers state that 0.6 is the minimum level for reliability of an instrument.

Hypothesis 2. There is not a statistically significant relationship between administrative placement of SI [Academic Affairs, Student Affairs, Administrative Affairs, joint reporting to two or more units, Enrollment Management, or other] with higher academic achievement of SI participants in comparison with Non-SI participants and satisfaction ratings with the SI program by the campus SI Supervisor at postsecondary institutions in the United States.

Relationship of SI Program Administrative Placement with Dependent Variables

The active and temporarily inactive SI programs were analyzed regarding the relationship of SI program administrative placement with the dependent variables. A one-way analysis of variance was used with the data.

TABLE 21
RELATIONSHIP OF SI PROGRAM ADMINISTRATIVE PLACEMENT WITH DEPENDENT VARIABLES

Dependent Variable	Number of Cases Analyzed	Mean Score	Std. Dev.	F	Sig.
Final Course Grade Difference	223	.5445	.299	.204	.936
D,F,W Grade Difference	182	17.833	10.520	.844	.499
Percent SI Attendance	257	31.992	19.905	1.595	.176
SI Supervisor Satisfaction	335	4.66	1.21	.301	.877

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

There was no statistically significant results for the analysis of administrative placement of the SI program within the institution and any of the four dependent variables.

Relationship of SI Program Administrative Placement and Age of SI Program

The active and temporarily inactive SI programs were analyzed regarding SI program administrative placement within the institution and the potential relationship with the length of time that the SI programs were still active. The data were analyzed using Chi-Square. The age of the SI program was blocked into quartiles.

TABLE 22

RELATIONSHIP OF SI PROGRAM ADMINISTRATIVE PLACEMENT AND AGE OF THE SI PROGRAM

	SI Program Length	One Year	Two to Three Years	Three to Six Years	Seven or More
Administrative Placement					
Academic Affairs	Count	26	55	57	62
	Expected Count	32.9	58.1	51.5	57.5
Student Affairs	Count	22	31	26	23
	Expected Count	16.8	29.6	26.3	29.3
Joint Reporting	Count	5	4	1	7
	Expected Count	2.8	4.9	4.4	4.9
Enrollment Management	Count	1	5	1	3
	Expected Count	1.6	2.9	2.6	2.9
Other	Count	1	0	0	1
	Expected Count	.2	.6	.5	.6
Total	Count	55	97	86	96
	Expected Count	55	97	86	96

Using Chi-Square analysis of the data, there was no significant statistical difference between administrative placement of the SI program and the length of time that the SI program had been in operation. The Chi Square analysis produced a value of 19.431 and a two-sided significant value of .195.

Hypothesis 3. There is not a statistically significant relationship between the fidelity by which the institution implements SI program activity constructs and the effectiveness of the SI program in terms of its helping students who participate in SI regarding academic achievement and satisfaction ratings by the college administrator who supervises the program.

Relationship of SI Program Activity Constructs and Age of SI Program

The active and temporarily inactive SI programs were analyzed regarding SI program activity constructs and the potential relationship with the length of time that the SI programs were still active. The multiple regression model used the age of the SI program as the response variable and the four SI program activity constructs as the set of quantitative independent variables. The age of the SI program was analyzed as a continuous variable. The variable names received the following designations:

AGE	Number of years that the SI program had been in existence
SUPI	SI Supervisor involvement with the SI program
LEAI	SI Leader involvement with the SI program
LEAT	SI Leader involvement in training activities
INSI	Institutional involvement with the SI program

TABLE 23

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF SI PROGRAM AGE AND THE INDEPENDENT VARIABLES

	AGE	SUPI	LEAI	LEAT	INSI
AGE	1.000				
SUPI	.049	1.000			
LEAI	.101	.322**	1.000		
LEAT	.029	.474**	.302**	1.000	
INSI	-.020	.142*	.051	-.021	1.000

n = 252; ** correlation is significant at the $p < .01$ level; * correlation is significant at the $p < .05$ level

Correlational analysis showed that the response variable of SI program age did not have a statistically significant relationship with the four independent variables of SI program activity constructs. There were several other statistically significant relationships identified from the analysis. The SI Supervisor Involvement construct was correlated with the following three constructs: SI Leader Involvement ($p < .01$), SI Leader Training ($p < .01$), and Institutional Involvement ($p < .05$). The SI Leader Involvement construct was correlated with the SI Leader Training construct at the $p < .05$ level.

Relationship of SI Program Outcome Variables and Age of SI Program

The active and temporarily inactive SI programs were analyzed regarding SI program outcomes and the potential relationship with the length of time that the SI programs were still active. The multiple regression model used the age of the SI program as the response variable and the four SI program outcomes as the set of quantitative independent variables. The age of the SI program was analyzed as a continuous variable.

The variable names received the following designations:

AGE	Number of years that the SI program had been in existence
GRD	Mean final course grade difference between SI and Non-SI groups
DFW	Difference of D, F, and withdrawal grades between SI and Non-SI groups
PART	Average participation rate of students with SI in the class
SATI	Satisfaction level with the campus SI program by the SI supervisor

TABLE 24

CORRELATIONAL MATRIX OF THE RESPONSE VARIABLE OF SI PROGRAM AGE AND THE INDEPENDENT VARIABLES

	AGE	GRD	DFW	PART	SATI
AGE	1.000				
GRD	-.043	1.000			
DFW	.046	.334**	1.000		
PART	.052	-.117	-.005	1.000	
SATI	.033	.234*	.201**	.206**	1.000

n = 149; ** correlation is significant at the p <.01 level; * correlation is significant at the p <.05 level

Correlational analysis showed that the response variable of SI program age did not have a statistically significant relationship with the four independent variables of SI program outcomes. There were additional correlations produced through the analysis. Final course grade were correlated with the rate of final course grades of D, F, and course withdrawal ($p < .01$). The satisfaction rating by the SI Supervisor was correlated with the mean final course grade in the course ($p < .05$), rate of D, F, and course withdrawals ($p < .01$), and higher rate of participation in the SI program by students enrolled in the class ($p < .01$).

Relationship of SI Program Outcome Variables and SI Program Activities

All SI programs were analyzed regarding SI program outcomes and the potential relationship with the SI program activities. The correlation matrix used the four SI program activities age of the SI program as the response variables and the four SI program outcomes as the set of quantitative independent variables. The variable names received the following designations:

SUPI	SI Supervisor involvement with the SI program
LEAI	SI Leader involvement with the SI program
LEAT	SI Leader involvement in training activities
INSI	Institutional involvement with the SI program
GRD	Mean final course grade difference between SI and Non-SI groups
DFW	Difference of D, F, and withdrawal grades between SI and Non-SI groups
PART	Average participation rate of students with SI in the class
SATI	Satisfaction level with the campus SI program by the SI supervisor

TABLE 25

CORRELATIONAL MATRIX ANALYSIS OF THE RESPONSE VARIABLE OF SI PROGRAM ACTIVITIES AND THE SI PROGRAM OUTCOMES

	GRD	DFW	PART	SATI	SUPI	LEAI	LEAT	INSI
GRD	1.000							
DFW	.346**	1.000						
PART	-.109	.-29	1.000					
SATI	.144*	.181*	.211**	1.000				
SUPI	-0.17	.086	.187**	.153**	1.000			
LEAI	-.041	.004	.154*	.172**	.297**	1.000		
LEAT	-.089	-.017	.098	.134*	.477**	.296**	1.000	
INSI	.049	.145	.083	-.040	.182**	.045	.054	1.000

n = 320; ** correlation is significant at the $p < .01$ level; * correlation is significant at the $p < .05$ level

There were significant correlations between some SI program activity constructs and the two of the four independent variables of SI program outcomes. Increased rates of participation in the SI program was correlated with the SI Supervisor Involvement construct ($p < .01$) and the SI Leader Involvement construct ($p < .05$). SI Supervisor satisfaction was correlated with the SI Supervisor Involvement construct ($p < .01$), SI Leader Involvement construct ($p < .01$), and SI Leader Training construct ($p < .05$). Additional correlations revealed by this analysis are: lower rate of D, F, and course withdrawals with higher mean final course grades ($p < .01$); higher levels of satisfaction by the SI Supervisor with higher mean final course grades ($p < .05$), lower rates of D, F, and course withdrawals ($p < .05$), and higher rates of SI attendance ($p < .01$); SI Supervisor Involvement construct with the SI Leader Involvement construct ($p < .01$), the SI Leader Training construct ($p < .01$), and the Institutional Involvement construct ($p < .01$); and SI Leader Involvement construct with SI Leader Training construct ($p < .01$).

Additional analysis was warranted to investigate the relationship of the SI program activity constructs and the two SI program outcomes that were found statistically significant: SI program participation rate and SI program satisfaction rating by the campus SI coordinator. Hierarchical multiple regression analysis was conducted to evaluate the relationships between independent and dependent variables.

Relationship of SI Program Activity Constructs and Participation Rate of Students with the SI Program

The active and temporarily inactive SI programs were analyzed regarding SI program activity constructs and the potential relationship with the participation rate of students in the SI program. The multiple regression model used the participation rate of students in the SI program as the response variable and the four SI program activity constructs as the set of quantitative independent variables. The participation rate of students in the SI program was analyzed as a continuous variable. The variable names received the following designations:

PART	Participation rate of students in the SI program
SUPI	SI Supervisor involvement with the SI program
LEAI	SI Leader involvement with the SI program
LEAT	SI Leader involvement in training activities
INSI	Institutional involvement with the SI program

TABLE 26

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF SI PROGRAM PARTICIPATION RATE AND THE INDEPENDENT VARIABLES

	PART	SUPI	LEAI	LEAT	INSI
PART	1.000				
SUPI	.162**	1.000			
LEAI	.152*	.286**	1.000		
LEAT	.069	.454**	.343**	1.000	
INSI	.087	.213**	.053	.008	1.000

n = 215; ** correlation is significant at the p <.01 level; * correlation is significant at the p <.05 level

There was significant correlation between the response variable of SI program participation rate and two of the four independent variables of SI program activity constructs: SI Supervisor Involvement (p <.01) and SI Leader Involvement (p <.05). In addition, there were other correlations among the variables: SI Supervisor Involvement was correlated with SI Leader Involvement (p < .01), SI Leader Training (p < .01), and Institutional Involvement (p < .01); and SI Leader Training with SI Leader Involvement (p < .01). The data warranted additional analysis to see which SI program activity constructs contributed to the prediction of SI program participation rates by the students.

TABLE 27

REGRESSION ANALYSIS OF SI PROGRAM PARTICIPATION RATE AND THE INDEPENDENT VARIABLES OF SI PROGRAM ACTIVITY CONSTRUCTS

Regression Model	R	R Square	Adjusted R Square	F	Sig F
Model 1	.162	.026	.022	5.745	.017*
Model 2	.196	.038	.029	4.241	.102

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

Model 1 = SI Supervisor Involvement

Model 2 = SI Supervisor Involvement + SI Leader Involvement

A regression analysis between the response variable of SI program participation rate and the four independent variables of SI program activity constructs found the SI Supervisor Involvement Construct was statistically significant ($p < .05$), however addition of the SI Leader Involvement Construct was not. Further analysis of the SI Supervisor Involvement Construct was warranted.

TABLE 28

STANDARDIZED REGRESSION COEFFICIENTS FOR TWO ADDITIVE MODELS FOR ANALYSIS OF SI PROGRAM PARTICIPATION RATE

Regression Model	Beta	t	Sig.
Model 1:			
SI Supervisor Involvement	.162	2.397	.017*
Model 2:			
SI Supervisor Involvement	.129	1.836	.068
SI Leader Involvement	.115	1.641	.102

* correlation was significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

Analysis of the Beta coefficients found that one was statistically significant at the $p < .05$ level, SI Supervisor Involvement. The two models had small effect sizes.

Follow-up analysis of the SI Supervisor Involvement Construct suggested that the following individual specific activities within this construct were statistically significant at the $p< .01$ level: (item #13) frequently evaluating the final course grades of SI participants and non-participants. The following two items from the construct were significant at the $p<.05$ level: (item #23) attending, observing, and providing feedback to first-time SI leaders; (item#24) attending, observing, and providing feedback to experienced SI leaders. The fourth item in the construct, (item #25) preparation background of the SI Supervisor, did not reach statistical significance.

Relationship of SI Program Activity Constructs and Satisfaction with SI Program

The active and temporarily inactive SI programs were analyzed regarding SI program activity constructs and the potential relationship with the satisfaction level of the campus SI Supervisor with the SI program. The regression model used the age of the SI program as the response variable and the four SI program activity constructs as the set of quantitative independent variables. The satisfaction level with the SI program was analyzed as a continuous variable. The variable names received the following designations:

SATI	Satisfaction level of the campus SI Supervisor with the SI program
SUPI	SI Supervisor involvement with the SI program
LEAI	SI Leader involvement with the SI program
LEAT	SI Leader involvement in training activities
INSI	Institutional involvement with the SI program

TABLE 29

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF SI PROGRAM CONSTRUCTS AND THE SATISFACTION LEVEL OF THE SI PROGRAM

	SATI	SUPI	LEAI	LEAT	INSI
SATI	1.000				
SUPI	.174**	1.000			
LEAI	.198**	.264**	1.000		
LEAT	.159**	.456**	.304**	1.000	
INSI	-.051	.168**	.047	-.017	1.000

n = 264; ** correlation is significant at the p <.01 level; * correlation is significant at the p <.05 level

There was significant correlation between the response variable of SI program satisfaction level by the campus SI Supervisor and the three of the four independent variables of SI program activity constructs at the $p < .01$ level: SI Supervisor Involvement, SI Leader Involvement, and SI Leader Training. Additional correlations were revealed by the analysis: SI Supervisor Involvement construct with SI Leader Involvement ($p < .01$), SI Leader Training ($p < .01$), and Institutional Involvement ($p < .01$); and SI Leader Training construct with SI Leader Involvement construct ($p < .01$). Additional analysis was warranted to discover which of the SI program activity constructs contributed to the prediction of the SI satisfaction rating by the SI Supervisor.

TABLE 30

REGRESSION ANALYSIS OF SI PROGRAM SATISFACTION RATE AND THE INDEPENDENT VARIABLES OF SI PROGRAM ACTIVITY CONSTRUCTS

Regression Model	R	R Square	Adjusted R Square	F	Sig F
Model 1	.174	.030	.027	8.170	.005**
Model 2	.235	.055	.048	7.626	.009**
Model 3	.242	.058	.048	5.379	.346

* correlation is significant at the $p < .05$ level; ** correlation is significant at the $p < .01$ level

Model 1 = SI Supervisor Involvement
Model 2 = SI Supervisor Involvement + SI Leader Involvement
Model 3 = SI Supervisor Involvement + SI Leader Involvement + SI Leader Training

A hierarchical regression analysis between the response variable of SI program satisfaction level and the four independent variables of SI program activity constructs found the SI Leader Involvement and the SI Supervisor Involvement Construct were statistically significant at the p <.01 level. However, the SI Leader Training Construct was not statistically significant. Further analysis of the SI Supervisor Involvement and the SI Leader Involvement Constructs was warranted.

TABLE 31

STANDARDIZED REGRESSION COEFFICIENTS FOR THREE ADDITIVE MODELS FOR ANALYSIS OF SI SATISFACTION RATE

Regression Model	Beta	t	Sig.
Model 1:			
SI Supervisor Involvement	.174	.2858	.005**
Model 2:			
SI Supervisor Involvement	.131	2.095	.037*
SI Leader Involvement	.164	2.626	.009**
Model 3:			
SI Supervisor Involvement	.104	1.526	.128
SI Leader Involvement	.151	2.364	.019*
SI Leader Training	.065	.944	.346

* correlation was significant at the p < .05 level; ** correlation is significant at the p < .01 level

Analysis of the Beta coefficients found that two were statistically significant at the p < .01 level, SI Supervisor Involvement and SI Leader Involvement. These two constructs had small effect sizes.

Follow-up analysis of the SI Supervisor Involvement Construct suggested that the following specific individual activities within this construct were statistically significant at the p < .05 level: (item #23) attending, observing, and providing feedback to first-time SI leaders; (item #24) attending, observing, and providing feedback to experienced SI leaders. The first item in the construct, (item #13) evaluating the SI program barely missed statistical significance at p <.054. The fourth item in the construct, (item #25) preparation background of the SI Supervisor, did not reach statistical significance.

Follow-up analysis of the SI Leader Involvement Construct suggested that the following specific individual activities within this construct was statistically significant at the p <.01 level: (item #19) SI Leader class attendance pattern and (item #28) SI Leader uses recommended SI session activities. Neither of the other two items in the construct reached statistical significance: (item #30) SI sessions begin as early as possible in the academic term and (item #31) SI sessions are offered frequently during the week.

Hypothesis 4. There is not a statistically significant relationship between the fidelity by which the institution implements discrete SI program elements and the whether the SI program is active or has been discontinued.

Relationship of SI Program Activity Constructs and Active Status of the SI Program

The SI programs were analyzed regarding the SI program activity constructs and their potential relationship whether the SI program was active/temporarily inactive or whether the SI program had been discontinued. The regression model used the status of the SI program as the response variable and the four SI program activity constructs as the set of quantitative independent variables. The status of the SI program was given a dichotomous variable. The variable names received the following designations:

STATUS	Active/temporarily inactive vs. discontinued status of SI program
SUPI	SI Supervisor involvement with the SI program
LEAI	SI Leader involvement with the SI program
LEAT	SI Leader involvement in training activities
INSI	Institutional involvement with the SI program

TABLE 32

CORRELATION MATRIX FOR THE RESPONSE VARIABLE OF SI PROGRAM STATUS AND THE INDEPENDENT VARIABLES

	STATUS	SUPI	LEAI	LEAT	INSI
STATUS	1.000				
SUPI	-.072	1.000			
LEAI	-.008	.295**	1.000		
LEAT	-.114	.448**	.300**	1.000	
INSI	.013	.164**	.069	-.027	1.000

* correlation is significant at the p <.05 level; ** correlation is significant at the p <.01 level

There was no significant correlation between the response variable of SI program status and the four independent variables of SI program activity constructs. However, the data analysis suggested several other correlations: SI Supervisor Involvement construct was correlated with SI Leader Involvement ($p < .01$), SI Leader Training ($p < .01$), and Institutional Involvement; and SI Leader Training construct with SI Leader Involvement construct ($p < .01$).

Summary

Study #1 focused on the SI program at UMKC. The independent variables of UMKC students included: (1) demographic variables such as gender, age, ethnicity/race, motivation; (2) previous levels of precollegiate academic achievement, and (3) rate of participation in the SI program. The dependent variables were student grade achievement in the course that has SI assistance provided for it and the persistence toward graduation of these students two academic terms later.

Students who participated in SI at UMKC received higher final course grades, lower rates of course withdrawals, and higher rates of reenrollment two academic terms later at UMKC. Measures of precollegiate academic achievement were also related with the dependent variables.

Study #2 focused on the SI program at 735 other postsecondary institutions in the United States that received SI supervisory training from UMKC. The major independent variables were administrative placement of the unit (academic affairs, student affairs, or other), length of time that the SI program had been in existence, and fidelity of the program regarding a set of four SI program activity constructs. The dependent variables were student grade achievement and satisfaction level of the campus SI coordinator with the SI program.

There was a positive relationship between three of the SI program activity constructs (SI Supervisor involvement, SI Leader involvement, and SI Leader training) with several dependent variables (SI participation rates and satisfaction rating of the SI program by the campus administrator who was the immediate supervisor).

There was not a relationship among other independent variables (administrative placement of the SI program and length of time that the SI program had been in existence) and the variables of SI program constructs, achievement levels of students, or satisfaction rating of the SI program by the campus SI administrator. There was no relationship between whether or not the SI program had been discontinued and any of the other variables under analysis.

CHAPTER 5

DISCUSSION

Overview

Purposes of the Study

There were two purposes of this research. The first was to investigate factors that may have a direct or indirect influence upon the effectiveness of the SI learning assistance and enrichment program to improve the academic performance of students that participate in the program (higher mean final course grades in the classes in which they receive academic assistance). The second purpose of this research was to identify practices that improve the effectiveness of the SI program and result in higher academic achievement for SI participating students and higher levels of satisfaction by the campus SI coordinator.

In Study #1 that focused on the SI program at the University of Missouri-Kansas City (UMKC), the major independent variables were demographic variables of UMKC students. The dependent variables were student grade achievement and persistence toward graduation.

In Study #2 that focused on the SI program at other postsecondary institutions in the United States that received training from UMKC, the major independent variables were administrative placement of the unit (academic affairs, student affairs, or other), length of time that the SI program had been in existence, and fidelity of the program regarding a set of SI program-related elements. The dependent variables were student grade achievement and satisfaction level of the campus SI coordinator with the SI program.

Problem to be Studied

Supplemental Instruction (SI) is effective in improving the academic achievement and graduation rates of college students based on a review of research studies from the University of Missouri-Kansas City (UMKC) and hundreds of other institutions in the United States and other countries (Arendale, 1999). Of the SI research studies conducted over the past two decades, no research has been conducted regarding the following three areas regarding potential influence upon student academic behavior or campus administrator satisfaction with the SI program: (1) influence of the administrative placement of the SI program within the institution; (2) length of time that the SI program has been in existence; and (3) fidelity with implementation of the SI program by the postsecondary institution.

Background on the SI Research Study

This debate about the essential nature of SI and the critical activities that should be conducted to obtain desired results is part of a larger issue within education. While the professional literature, professional associations, and national conferences often identify "exemplary" educational practices for potential adoption by other institutions who wish to obtain similar outcomes, it is uncommon to see accompanying detailed research studies that identify the specific program activities that need to be followed to obtain the same results as reported by the original institution that created the educational practice. Which specific activities are essential to obtain the desired results? Which activities continue to be observed not because they are essential, but rather because they are part of the tradition and history of the educational practice? What practices may actually be ineffective or actually counterproductive to the desired results? What other variables may be involved in the success of the educational practice at the institution that created it that cannot be easily duplicated at other institutions?

Theoretical Basis

Supplemental Instruction is based upon several related educational theories. It is grounded in a developmental framework (Blanc, DeBuhr, & Martin, 1983). Vygotsky (1978, p. 86) through his framework of the Zone of Proximal Development helps to explain the dynamics within the group setting where participants are often able to extend themselves to higher levels of thought than predicted. The relationship between the SI leader and the SI participants is a practical expression of this framework. Tinto's research (1993) identified that successful integration of the student with the academic and social dimensions of the institutions were powerful influences for student persistence. Student involvement with peers is a common means for students to become integrated with the institution. Astin stated that "Generally, students tend to change their values, behaviors, and academic plans in the direction of the dominant orientation of their peer group . . . the student's peer group is simply the most potent source of influence on growth and development during the undergraduate years" (1993, pp. 363, 398). Metacognition learning theory states that effective learning is enhanced by learners who are both aware of learning tasks, knowledgeable of possible learning strategies, and skilled in their use (Weinstein & Stone, 1996). SI sessions commonly embed the use of metacognitive strategies. "Situated cognition" states that learning is most likely to occur when study strategies and academic content are dealt with within the context of a specific academic discipline. Immediate application of the study strategies must be made with the academic content if learners are expected to deeply master the strategies and can use them in other learning situations (Hattie, Biggs, & Purdie, 1996).

This research study employs current education research and evaluation theory to guide the quantitative studies. Study #1 examines variables that may be related to improved student outcomes such as higher academic achievement and increased persistence toward graduation. The Input-Environment-Outcomes (I-E-O) evaluation model was utilized for this study (Astin 1993, 1991, 1977, 1970b, 1970a, 1962). Outcomes (student characteristics after exposure to the environment) are related to the Inputs (characteristics of the student at the time of initial entry to the institution) and interactions with the Environment (various experiences to which the student is exposed). Rather than a "true experimental" study where all variables are controlled and manipulated, Astin's I-E-O research model is "natural" study that looks at the students' interaction with the environment (e.g., participation with SI). This research design produces a correlational study of the relationship of the variables. The magnitude of effect should be proportional to the degree of exposure (Astin, 1993, p. 28).

Study #2 examines variables that may be related to student outcomes such as higher academic achievement and lower rates of course withdrawal. Additionally, the satisfaction rate of the SI program by the campus administrators who supervise the SI program was examined. This study assessed SI program implementation. King, Morris, and Fitz-Gibbon (1987, p. 9) argue that limiting evaluation to only program outcomes can potentially answer only the question of "did it work" and not the deeper question of "what worked and what did not" and how those variables contributed to the final outcome. "Program implementation research" focuses on the process of the intervention rather than only on the final product and potentially can yield much valuable information to permit program revision and improvement. This research has never been conducted regarding the implementation of the SI program at hundreds of institutions throughout the United States.

Discussion of Findings

This investigation of Supplemental Instruction programs at the University of Missouri-Kansas City and at other postsecondary institutions in the United States will test the following null hypotheses.

Hypothesis 1

Hypothesis 1. There is not a statistically significant relationship between participation in SI and higher academic achievement at the University of Missouri-Kansas City. Comparative academic achievement measures would include mean final course grade, rate of A and B final course grades, rate of D and F final course grades and course withdrawals, rate of course withdrawals, and rate of reenrollment at the University for two academic semesters after the completion of the course that offered SI.

This null hypothesis is rejected by the data. In comparison with the Non-SI participants, the SI participants in the General Chemistry I class earned higher mean final course grades (2.96 vs. 2.25), higher combined rate of A and B final course grades, lower combined rate of rates of D, F and W final course grades, lower rate of course withdrawals, and a higher rate of reenrollment at the institution during Fall 1999. These findings replicate previous studies reported in the professional literature concerning research at UMKC and other institutions (Arendale, 1999).

Campus faculty members want to see higher rates of A and B final course grades since these generally suggest "honor" grades and suggest higher mastery of course material by students. The faculty often cite academic success as the achievement by many of their students with grades in this range. While campus administrators share a desire to see the same outcome, they also are concerned with lower rates of course withdrawals since it reduces the number of students who have to reenroll in classes, by that increasing class size that may lead to the employment of additional faculty members to instruct these students. Administrators also seek higher persistence and reenrollment rates since it helps the institution to concurrently meet the objectives of higher fulfillment of institutional mission of graduating students and increasing student tuition payments by higher rates of students persisting at the institution.

Additional analysis investigated the potential influence of student demographics, previous levels of precollegiate academic achievement, student motivation to attend SI sessions, and the actual level of SI participation during the academic term that the students were enrolled in General Chemistry I during Fall 1998. There were no statistically significant differences between the SI and Non-SI participants regarding these independent variables except high school graduation percentile rank (SI group 92.6 vs. Non-SI group 87.9, $p < .05$). However, there was not a statistically significant difference between the two groups regarding their ACT composite score (SI group 26.7 vs. Non-SI group 26.1). This leaves a conflicting analysis regarding the previous precollegiate academic achievement of these students since both variables (high school graduation rank percentile and ACT composite score) are generally regarded as measurements of the same nature. While standardized examination scores may provide uniform comparison measures for students across the U.S. since they use the same test items, the same cannot be stated for attempts to compare academic standards among secondary schools that may have different expectation levels and exit competency standards.

All independent variables in the previous analysis were added to subsequent regression equations except initial motivation to participate in SI sessions. While there was no statistically significant difference in this motivation level for either the SI or

Non-SI groups, it was not included for further analysis since the low response rate (26 of 128 students completed the optional survey item) would have reduced the predictive ability of regression models due to most students being removed due to missing data.

Multiple regression and hierarchical regression analysis models helped to identify individual variables and variable constructs that predicted the dependent variables of final course grade and reenrollment in subsequent academic terms. Besides higher rates of SI participation predicting the final course grade ($\underline{p} < .05$), high school graduation percentile rank and ACT composite score also were statistically significant ($\underline{p} < .01$). This appears to suggest that in this class, participants in SI sessions had enjoyed higher levels of academic achievement than the Non-SI participants. This is inconsistent with most published studies since the data suggests that there is no statistically significant difference between the SI and Non-SI groups. Additional analysis using hierarchical regression analysis of the independent variable constructs of student demographics, previous levels of academic achievement, and SI attendance found that while student demographics did not contribute to the predictive equation, the addition of previous levels of precollegiate academic achievement and SI attendance rates were statistically significant at the $\underline{p} < .01$ level.

For the students enrolled in the General Chemistry I class during Fall 1998, reenrollment at UMKC during Fall 1999 was positively related to increasing levels of SI attendance at the statistically significant $\underline{p} < .05$ level. This is consistent with previous published research reports (Arendale, 1999).

Several other individual independent variables also contributed with reenrollment patterns at the institution: non-Caucasian ethnicity, younger age, high school graduation rank percentile, and ACT composite score. Due to the research design, ethnicity/race was a dichotomous variable of Caucasian and non-Caucasian. This meant that underrepresented student subpopulations (African-American, Native American, Hispanic, Latino, etc.) were also combined with Asian-American and international students. Past research at UMKC suggests that Asian-Americans and international students have historically higher persistence and academic achievement rates when compared with all other groups including Caucasians. This had an impact upon the outcome of this variable in the regression equation.

The variable of younger age was statistically significant ($p < .05$) in the regression equation. This may be due to students who have just completed high school being more academically-ready for the first-year rigor of college than older students who were returning to school after being elsewhere for a long time. Also, older students are more likely to temporarily stop out of college for short periods to earn additional income needed for college expenses than traditionally-aged students who may be relying upon scholarships, federal financial aid or other support by their parents.

Both high school graduation rank percentile and ACT composite score were statistically significant at the $p < .01$ level. Both variables are often viewed as measuring previous levels of academic achievement. It is reasonable to expect that both would also contribute to a multiple regression analysis of factors contributing to higher reenrollment rates at an institution.

The Input-Environment-Outcomes (I-E-O) evaluation model was utilized for this study (Astin 1993, 1991, 1977, 1970b, 1970a, 1962). Outcomes (student characteristics after exposure to the environment) are related to the Inputs (characteristics of the student at the time of initial entry to the institution) and interactions with the Environment (various experiences to which the student is exposed). The magnitude of effect should be proportional to the degree of exposure (Astin, 1993, p. 28). It is not surprising that other independent variables contributed besides the level of SI attendance to the correlation with dependent variables such as final course grades and reenrollment status in subsequent academic terms.

Hypothesis 2

Hypothesis 2. There is not a statistically significant relationship between administrative placement of SI [Academic Affairs, Student Affairs, Administrative Affairs, joint reporting to two or more units, Enrollment Management, or other] with higher academic achievement of SI participants in comparison with Non-SI participants and satisfaction ratings with the SI program by the campus SI Supervisor at postsecondary institutions in the United States.

The null hypothesis was accepted. It had been predicted that one type of administrative placement for the SI program would have been more beneficial for supporting an SI program and as a result would contribute to higher student outcomes and satisfaction ratings by the SI Supervisor. The question of administrative placement is a common one raised during SI Supervisor training workshops at UMKC. While a decade ago most SI programs were administered under student affairs with about half the rate placed under academic affairs, the survey data from this research study suggested that this had been reversed with nearly two-thirds of SI programs administered under academic affairs. Some had argued that placement under academic affairs would have been more beneficial since on most campuses this division commands the most prestige and financial resources. Others had argued that student affairs would have been the better site since traditionally programs such as academic support have been located within this division as they are concerned with the student development-related programs.

There are several possible explanations for no statistically difference between the different types of administrative placement and the four SI program outcomes. The first is that there actually is no difference and that the findings are valid and reliable. The second is that the unique campus culture on individual campuses is more important to contributing resources for support of a successful SI programs than just whether the program is placed under academic affairs, student affairs, or other forms of administrative assignment.

The third possible answer is that the methodology for collecting the information was flawed through both the SIPQ survey instrument (moderate level of reliability) or through the manner in which two of the outcome variables were collected. Rather than asking the campus SI Supervisor to provide a mean final course grade for both the SI and Non-SI groups, the survey asked for the difference between those two numbers.

This provided only one number for used in the statistical analysis rather than two. The same was true for the rate of D, F, and W final course grades. The researcher had initially felt that this manner of data collection would have been easier for the respondent to supply rather than asking them to compute the two mean scores (SI and Non-SI Groups). Consultations with other researchers suggest that the reduction from two to one piece of data (only the difference between the two numbers) may have reduced the variability of response, therefore masking the actual correlation between the independent and dependent variables.

The final reason for not finding a relationship between administrative placement and the four dependent variables is that more information must be collected for analysis to study the possible impact by other cross-institutional variables such as institutional characteristics (date established, geographic regions of U.S., control by local/state/independent, affiliation by public/independent, IRS status, percent of expenditures for student services, percent of expenditures for instruction); curricular characteristics (school calendar system, Carnegie classification, highest degree offered), faculty environment (student-faculty ratio, average faculty salary), and peer environment (student body type of coed/male/female), average undergraduate tuition and fees, fall enrollment headcount, average ACT or SAT score for first-time students, admissions' selectivity, historic ethnic majority, drop out rates from first-year to sophomore, and graduation rates). In this scenario, administrative placement might be statistically significant if also other variables were added to the predictive model. Perhaps academic affairs' placement at public four year institutions would be statistically significant while student affairs' placement might be significant if combined with public two year colleges.

Hypothesis 3

Hypothesis 3. There is not a statistically significant relationship between the fidelity by which the institution implements SI program activity constructs and the effectiveness of the SI program in terms of its helping students who participate in SI regarding academic achievement and higher satisfaction ratings by the college administrator who supervise the program.

The null hypothesis was partially rejected. Several SI program activity constructs were correlated with two of the SI program outcomes: increasing rates of SI participation and higher rates of satisfaction with the SI program by the SI Supervisor who administrates it. This is the first time that research has been conducted on the essential nature of specific SI program activities and their potential relationship with student academic achievement outcomes and higher ratings of satisfaction with the SI program by the campus administrators who supervise it. This has been a persistence issue raised during SI Supervisor training workshops frequently in the past. A common question posed by some potential SI Supervisors is the degree to which the SI program can be modified and specific SI program activities not observed and yet still achieve the same desired outcomes for students and campus administrators.

Although the SI programs reported higher mean final course grades for SI participants (mean difference of 0.54) and a lower rate of D, F, and course withdrawals (mean difference of 17.8 percent), the results did not reach statistical significance in relationship with any of the four SI program activity constructs. As mentioned with discussion of the previous hypothesis, a possible reason that statistically significance was not found between the two student academic achievement dependent variables (difference in mean final course grade, difference in a combined rate of D, F, and W final course grades) and one or more of the four SI program activity constructs were that the methodology for collecting the information was flawed through both the SIPQ survey instrument (moderate level of reliability for measurement of the four SI program activity constructs) or through the manner in which two of the outcome variables were collected. Rather than asking the campus SI Supervisor to provide a mean final course grade for both the SI and Non-SI groups, the survey asked for the difference between those two numbers. This provided only one number for used in the statistical analysis rather than two. The same was true for the rate of D, F, and W final course grades. The researcher had initially felt that this manner of data collection would have been easier for the respondent to supply rather than asking them to compute the actual mean scores. Consultations with other researchers suggest that the reduction from two to one pieces of data may have reduced the variability of response, therefore masking the actual correlation between the independent and dependent variables.

Initial analysis investigated the relationship between the four SI program activity constructs and the length of time that the SI program had been in existence. It had been assumed that SI programs would change over time with the way that it implemented the program on campus. The data suggests that the campus SI Supervisor did not change the way that they implemented the program over time. A follow-up study of the four SI program outcomes (grade achievement, reduction of D, F and W grades, SI participation rates, and SI program satisfaction rating) with the length of time that the SI program had been in existence did not find any relationship. It had been assumed that as SI programs matured and the SI Supervisor acquired more experience with administering the program, positive outcomes for student academic achievement, student renrollment rates, and satisfaction ratings by the campus SI Supervisor would increase. The data analysis did not support this. This outcome is difficult to explain since many educational practices increase in effectiveness as the programs mature and the supervisory staff gains valuable experience that allows for improvement.

These outcomes suggest that SI program administrators do not change implementation of their program after their initial training workshop at UMKC. Perhaps additional training opportunities need to be provided by the SI office at UMKC for SI Supervisors. Currently an Internet listserv computer discussion group and a SI web site with more than one hundred SI-related articles or links to further resources are provided. Beyond these, new professional development opportunities could include advanced SI Supervisor workshops, substantive periodic newsletters geared for the needs of SI Supervisors, and dissemination of follow-up training materials through print, video, and Internet delivery systems.

Hypothesis 4

Hypothesis 4. There is not a statistically significant relationship between the fidelity by which the institution implements discrete SI program elements and the whether the SI program is active or has been discontinued.

The null hypothesis was supported by the data. It was surprising that there were no statistically significant differences between the two categories of SI programs: active and discontinued. It had been theorized that discontinued SI programs had been operated in a manner inconsistent with procedures recommended by UMKC during their SI Supervisor training workshops and by that produced low program outcomes leading to their discontinuance. While this may have been the case, several issues related to research design and analysis may have contributed to concealment of this finding.

First, the number of discontinued SI programs (n = 20) that responded to the SI survey was small in comparison with the response rate by respondents from the active SI programs (n = 320). Second, part of the low response rate was related to the nature of discontinued SI programs, the person who was most qualified to complete the survey had left and was unavailable to complete the survey. This resulted in a low response rate and many incomplete responses since the responder did not have the information necessary. This research study surveyed every person trained to implement the SI program since national the training program started in 1981. Many discontinued SI programs had not been active more than a decade. Most SI programs are administered by staff positions within the institution, not faculty members. Staff positions often have more turnover than their counterparts in the academic ranks.

Another survey question completed by the respondents from discontinued SI programs provided a list of responses of why the program was eliminated. Respondents could select one or more reasons for the program to be discontinued. The most frequently cited reason was that funding had been redirected to other learning assistance or enrollment management programs. The second most frequently cited reason was that the person originally appointed by the institution to supervise the program -- and generally trained by UMKC -- had left the institution and that the program was discontinued upon their departure. While academic departments persist no matter the changeover in administrative leadership or teaching staff, some programs that are of more recent origin such as academic assistance, women's issues, and minority affairs are more likely to be subject to reorganization or elimination when the original staff member in charge of such a program is promoted within the institution or accept new positions outside.

Implications and Importance of the Study

The results of this research add new knowledge regarding variables that influence the effectiveness of Supplemental Instruction programs in helping students to be more successful in postsecondary education. This study also presents many more questions that need to be investigated to confirm this study and to extend it with more sophisticated levels of inquiry. The research models used in this study can be replicated by others to study these or other variables.

Study #2 of U.S. programs that have received training to begin their own SI programs provide findings regarding the correlation of administrative placement of the program and implementation of key SI program activities with the effectiveness of the program in helping students. These data suggest that there is not a preferred administrative placement for SI programs. This finding encourages further research to investigate other campus cultural factors that might have a more influential role in supporting the success of academic enrichment programs like SI than just focusing on the narrow variable of administrative placement. With the present environment of limited funds for campus programs, it is important that campus administrators carefully select the location for learning assistance programs to maximize their benefit for helping students to be successful and retained through to graduation. Increased persistence toward graduation can provide additional funds for the institution through student tuition, fees, and other purchases made by students who might otherwise drop out.

The most important findings in the study are the identification of critical SI program activities that should be followed to maximize the benefit of the SI program with improving student academic achievement and satisfaction levels of the campus administrators with the SI program. The most expensive investment in successful SI programs is the time commitment for SI Supervisor involvement, SI Leader involvement, and SI Leader training.

SI Supervisors must have the time to provide frequent feedback to both the new and experienced SI Leaders by directly observing them as their conduct SI sessions.

This feedback must occur early during the academic term and continue as necessary. Returning SI Leaders need to continue receiving feedback to improve their effectiveness in facilitating SI sessions. In addition, the SI Supervisor must take the time to frequently evaluate the SI program, providing valuable feedback regarding the program so that compliancy or regression of SI program results does not occur.

SI Leaders involvement activities include attending all class sessions, using the recommended SI session activities, beginning to offer SI sessions early in the academic term, and offering three or more SI sessions each week to ensure multiple opportunities for students to attend once a week. Sometimes administrators express that they would rather not pay SI Leaders to attend class sessions, participate in training activities, or to take time to prepare in advance for SI sessions. This study suggests that such an investment of time and money is essential to obtain the results needed by the campus administrators.

SI Leader training involvement activities correlated with improved program outcomes included training activities both before and during the academic term. As described earlier, time is an essential component in obtaining desired higher program outcomes. This balance of training sequence suggests that while some training issues can be presented before the experience of serving as a SI Leader has occurred, other issues must be dealt with concurrent with the experience. SI Leaders can become highly motivated to learn new things during these "teachable moments" since they want to solve problems that they have just encountered.

There was no correlation between institutional involvement and the four SI program outcomes. This issue needs further investigation since the current study only had one specific institutional involvement measure (support level of the SI program by the faculty member who were the host to SI in his or her class). Further research studies could investigate other potential institutional involvement activities such as level of funding for the program, delegated authority for the SI Supervisor, and others.

This study may also spur similar studies for tutorial and other forms of academic assistance or enrichment. There is a lack of consensus regarding the type and length of training required for student paraprofessionals such as academic tutors, mentors, and other staff members who provide direct service to students. While some studies have identified that training is essential, the key elements regarding content, length of training, and the timing of such training has not been widely published within the professional literature nor gained the consensus of leaders in the field of developmental education.

Limitations

Limitations of the research related to Study #1 concerning SI operating at the University of Missouri-Kansas City include the following:

1. The sample was derived from students enrolled at the University of Missouri-Kansas City (UMKC) during Fall 1998. It may be difficult to generalize the results since study #1 was conducted at only one institution. UMKC is a public four-year doctoral granting institution of approximately 11,000 students located

in an urban setting within the Midwest. UMKC has a selective admissions criteria with an exception rate of 10 percent of its students who are not required to meet that standard for admissions.

2. Only one class was selected for analysis (General Chemistry I, Chem 211). It may be difficult to generalize the results to other academic disciplines.
3. The study only followed the students for twelve months regarding academic achievement and reenrollment with the same institution.
4. A pure experimental research model was not employed since the researcher did not want to deny academic assistance to a control group since this was perceived as an ethical concern.
5. This research design decision introduced possible confounding variables such as motivation that could have an impact on student behavior.
6. SI was only offered in classes where faculty members were supportive of the program. While this is a program characteristic, it is possible that a faculty member who is supportive of SI may conduct their classes differently than classes where professors are not supportive of the SI program.
7. Due to the research design, there could only be limited attribution of causality regarding the relationship between independent and dependent variables.

Limitations of research related to Study #2 concerning SI operating at hundreds of postsecondary institutions across the United States include the following:

1. The sample was derived from all institutions in the United States that sent personnel from their institutions to attend a multi-day SI Supervisor training workshop hosted by UMKC.
2. The response rate to the mailed survey was approximately 50 percent. Responses were unavailable from the other potential respondents who could have influenced upon the analysis of data and discussion of the results.
3. Some institutions that have implemented the SI program, but are unknown to the National SI Center at UMKC, would not have been invited to participate in this research study. Their survey responses could have influenced upon the analysis of data and discussion of results.
4. Most of the respondents were institutions that had active SI programs. The response rate from institutions that never started or discontinued their SI programs was much lower. This made it more difficult to compare active and discontinued institutions.
5. Rather than providing detailed information about each class where SI was offered, survey respondents were asked to average results for an academic term. Also, respondents were asked to provide the "difference" in grade achievement between the SI and Non-SI groups rather than providing the actual grades for each group. While this research design decision was made to increase the likelihood of survey completion, this may have influenced the analysis of the data.

6. Due to the research design, there could only be limited attribution of causality regarding the relationship between independent and dependent variables.

The survey instrument had a reliability rating of approximately 0.6, suggesting moderate level of reliability. This may have limited the effectiveness of the instrument to gather accurate information for analysis.

Recommendations for Future Research

The findings from this study raise several issues that can be addressed in future studies. Recommendations for replication studies concerning student achievement at an individual institution (Study #1):

1. Include the collection of other important preattribute variables of students enrolled in the classes where SI was offered (e.g., student motivation, self-efficacy, attribution of effort, use of cognitive learning strategies).
2. Conduct follow-up studies to examine whether there is a relationship between previous participation with SI academic performance and use of learning strategies modeled in SI sessions during the previous academic term in the next course in the academic sequence.
3. Conduct follow-up studies to examine whether there is a relationship between previous participation with SI and academic performance in other classes within the same or following academic terms.

4. Conduct follow-up studies to examine whether there is a relationship between previous participation with SI and the use of cognitive learning strategies with classes during the same or future academic terms.
5. Conduct follow-up studies to examine the possible synergetic relationships between previous participation with SI and other campus programs (e.g., first-year experience class, new student orientation, campus counseling services, campus tutoring programs, campus writing center).
6. Add as independent variables other previous collegiate academic achievement measures such as previous academic term grade point average, cumulative grade point average, final course grade in a prerequisite course for the one that provides SI, and final course grade in a previous course in the sequence for the one enrolled that provides SI.
7. Expand the dependent variables to include changes in affective domain areas (e.g., student self-efficacy).
8. Conduct a qualitative study of SI participants and nonparticipants in classes where SI was offered.
9. Study the possible variables surrounding the SI leader that might have an impact upon the SI participants (e.g., number of terms served as SI leader, college cumulative grade point average, similar academic major to course serving as SI leader, career aspirations)

10. Study additional potential outcomes of SI involvement: number of credit hours attempted in the following academic term; percent of credit hours completed with a grade of C or higher in the following academic term; academic term grade point average in the following academic term; and graduation with undergraduate degree within seven years of first enrollment at the institution.
11. Study the potential impact of the SI program upon the SI Leader to examine both cognitive and affective domain changes (e.g., leadership, communication skills, change of academic major, personal use of SI strategies in other classes).
12. Study the use of the first examination score in the class where SI is offered as a predictor of the students' academic ability. Evaluation of this variable may serve as a better predictor of previous levels of academic achievement than standardized college entrance examinations (e.g., ACT, SAT) or high school graduation rank percentile.
13. Study the potential relationship of specific behaviors of the SI Leader (e.g., communication interactions, use of specific SI session activities) and higher academic achievement by SI participants, higher rates of participation, and higher satisfaction rates by the SI program administrator.
14. Review the behavior of former SI participants in classes where SI is not offered regarding the formation of study groups and other forms of learning communities.

15. Compare the outcomes of participation of SI with other forms of academic assistance and enrichment such as tutoring and learning communities.

16. Review specific SI session strategies related to student outcomes and how those strategies may differ based upon unique demands of various academic disciplines.

17. Study the potential impact of first-generation potential college graduate and low socio-economic background of students regarding outcomes (e.g., SI participation rates, behavior during SI sessions, use of SI session learning strategies, final course grades, reenrollment rates).

18. Compare the efficacy of SI participation for students in difference academic disciplines. Discover specific SI program activities customized for specific academic disciplines related to improving the academic of success of students.

19. Study the academic performance of students who participate in SI in two of more classes within the same academic term. Is there a synergistic impact upon students who participate in SI from different academic disciplines regarding academic achievement during the same and future academic terms?

TABLE 33

SUGGESTED FUTURE INDIVIDUAL CAMPUS SI STUDY

Input Variables	Environmental Variables		Outcome Variables
	Bridge	Involvement	
1. Student Demographics a. Ethnicity and race b. Gender c. Age d. Student classification (e.g., first-year, sophomore) e. First-generation college	1. Federal financial aid eligibility 2. Probationary admission to the institution	1. SI attendance 2. Number of terms SI Leader has served in position	1. Final course grades in SI course a. Final course grade b. Final course grade of A and B c. Final course grade of D, F or withdrawal d. Course withdrawals
2. Previous precollegiate academic achievement a. ACT/SAT scores b. High school graduation rank percentile c. Individual high school class grades c. Other assessments	3. Initial student motivation to attend SI sessions 4. Academic major (e.g., undeclared, business, health science)	3. Use of other resources (FYE class, Writing Lab, counseling services)	2. Enrolled at campus following 12 months
3. Previous collegiate academic achievement a. Previous term GPA b. Cumulative GPA c. Final course grade in prerequisite course d. Final course grade in previous course in sequence	5. First exam score in same class as SI		

Based on Astin's Input-Environment-Outcome Evaluation Model (1993, 1991, 1977, 1970b, 1970a, 1962)

Recommendations for replication studies of SI programs located outside Kansas City (Study #2):

1. Create a similar study to examine SI programs outside the United States. This might require contextualizing the questions to address different types of assumptions, data variables, and operating principles for education systems different from the United States.
2. Redesign the survey in several ways to increase the reliability of the instrument: create additional questions related to each SI program activity constructs; revise survey questions when possible to provide responses that provide data that was interval or ratio rather than ordinal and categorical, therefore permitting more rigorous levels of statistical analysis.
3. Request that survey respondents provide the actual mean SI and non-SI final course grade averages and withdrawal rates for individual courses within the academic term under analysis.
4. Include additional variables for analysis such as institutional characteristics (date established, geographic regions of U.S., control by local/state/independent, affiliation by public/independent, IRS status, percent of expenditures for student services, percent of expenditures for instruction); curricular characteristics (school calendar system, Carnegie classification, highest degree offered), faculty environment (student-faculty ratio, average faculty salary), and peer environment (student body type of coed/male/female), average undergraduate tuition and fees, fall enrollment headcount, average ACT or SAT score for first-time students,

admissions' selectivity, historic ethnic majority, drop out rates from first-year to sophomore, and graduation rates).

5. Conduct more detailed follow-up studies to investigate the current set of four SI program activity constructs (SI Supervisor involvement, SI Leader involvement, SI Leader training, and institutional involvement) and to detect whether other constructs should be added to the previous set of four. While the current study suggests a positive relationship between the amount of supervision provided to the SI Leader, it did not recommend the most effective methods of conducting SI supervision. While SI Leader training both before and during the academic term was identified as contributing to improved SI program outcomes, it did not suggest the most important topics to be presented during the training and the most effective times of the academic term for training on those topics to occur. The construct of institutional involvement needs further investigation to identify other potential activities that the institution can engage in to support the SI program and increase the desired program outcomes.

TABLE 34

SUGGESTED FUTURE NATIONAL SI STUDY

Input Variables	Environmental Variables		Outcome Variables
	Bridge	Involvement	
1. Institutional characteristics	1. Age of the SI program	SI Program Fidelity Constructs:	1. SI program status (e.g., active, discontinued)
2. Curricular characteristics	2. SI program administrative placement	1. SI Supervisor involvement	2. Student academic performance a. Mean final course grade gain in SI course
3. Faculty environment		2. SI Leader involvement	b. Mean reduction of final course grades of D, F, or withdrawal in SI course
4. Student environment		3. SI Leader training	c. Percent of students participating in SI
		4. Institutional involvement	3. Satisfaction level of the SI supervisor with the SI program

Based on Astin's Input-Environment-Outcome Evaluation Model (1993, 1991, 1977, 1970b, 1970a, 1962)

Summary

Portions of each study confirmed previous theories and assumptions about the SI program while other findings presented new areas for investigation. Analysis of the UMKC SI program confirmed previous studies that found that SI attendance contributed to higher academic achievement and reenrollment rates for participating students. The study of U.S. SI programs identified that several recommended SI program activity constructs were correlated with higher desired SI program outcomes. This research is important as it helps to identify the specific program activities that contribute to improved student outcomes. This research is important for encouraging further investigations of SI and other educational practices to identify which individual program activities need to be implemented to obtain desired program outcomes. Due to the frequent need to customize implementation of educational practices to deal with institutional environmental conditions, it is essential to identify the critical program components. This allows the institution to carefully target scarce resources of money, personnel, and time on the most important components that produce the largest desired outcomes. This brings a higher level of sophistication to program implementation and expectation of the institution with obtaining the greatest amount of benefit for the support that can be allocated to it.

APPENDIX A

SURVEY CORRESPONDENCE

UMKC
UNIVERSITY OF MISSOURI
KANSAS CITY

Center for Academic Development
Student Academic Support
Services Building
5100 Rockhill Road
Kansas City, Missouri 64110-2499

Phone: 816 235-1174
Fax: 816 235-5156

www.umkc.edu/cad

Location: 5014 Rockhill Road

High School VSI Program
Phone: 816 235-1100

Student-Athletic Academic Support
Phone: 816 235-1164

Supplemental Instruction (National Dissemination)
Phone: 816 235-1178

Supplemental Instruction (UMKC Program)
Phone: 816 235-1166

Video-Based Supplemental Instruction
Phone: 816 235-1179

Upward Bound
Phone: 816 235-1115

November 23, 1998

Dear Colleague:

In early December you will receive a copy of the first national survey questionnaire regarding Supplemental Instruction (SI). We are asking for everyone who has attended SI Supervisor training to complete the survey - no matter the status of the institution's SI program or whether they are the campus SI supervisor. There is much to learn from respondents of the discontinued or never started SI programs as the active ones.

The U.S. Department of Education has requested this information to evaluate the effectiveness of SI and programs similar to it in developing stronger student academic support services. Your response is important to us whether or not you have an active SI program. Of course, all information gathered through this survey is confidential.

In appreciation for your response, you can select to receive one or more of the following items: summary of the results from this survey, copy of our most recent SI Leader Training Workbook, copy of the one-hundred page annotated bibliography of SI publications and a new SI Supervisor directory.

At your service,

David R. Arendale
National Project Director for Supplemental Instruction

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UMKC
UNIVERSITY OF MISSOURI
KANSAS CITY

Center for Academic Development
Student Academic Support Services Building
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Phone: 816 235-1178

Supplemental Instruction (UMKC Program)
Phone: 816 235-1166

Video-Based Supplemental Instruction
Phone: 816 235-1179

Upward Bound
Phone: 816 235-1115

December 7, 1998

Dear Colleague:

We would appreciate your help in completing our first national survey regarding Supplemental Instruction (SI). We are asking for everyone who has attended SI Supervisor training to complete the survey - no matter the status of the institution's SI program or whether they are the campus SI supervisor. The U.S. Department of Education has requested this information to evaluate the effectiveness of SI and programs similar to it in developing stronger student academic support services.

Your response is important to us whether or not you have an active SI program. Of course, all information gathered through this survey is confidential. We will not release individual information concerning your institution.

We hope to hear from you soon. In appreciation for your response, you can select to receive one or more of the following:

- summary of the results from this survey
- updated SI Leader Training Workbook
- one-hundred page annotated bibliography of SI and VSI publications
- copy of the new SI Supervisor directory.

To ensure timeliness of this survey, may we hear from you within the next two weeks? **Please return the survey before you depart for the holiday break**. We have enclosed a postage-paid reply envelope for your convenience in returning the questionnaire. You can also FAX the information back to us as well. Our FAX number is (816) 235-5156. If you have additional comments or questions, please call me at (816) 235-1197. My email address is arendaled@umkc.edu

At your service,

David R. Arendale
National Project Director for Supplemental Instruction

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Supplemental Instruction (UMKC Program)
Phone: 816 235-1166

Video-Based Supplemental Instruction
Phone: 816 235-1179

Upward Bound
Phone: 816 235-1115

January 26, 1999

Dear Colleague:

About a month ago we wrote you seeking your opinion about the Supplemental Instruction (SI) program. As of today we have not yet received your completed survey, although over 60% of the responses are in.

We have organized the survey so that those who have discontinued or never started SI programs need only answer a few of the initial questions. The remainder of the questions are for people with active SI programs.

We are writing to you again because of the significance each survey has to the usefulness of this study. You were selected because we feel that you can make a unique contribution. In order for the results of this study to be truly representative it is essential that you return your survey.

In appreciation for your response, you can select to receive one or more of the following items:

- summary of the results from this survey
- updated SI Leader Training Workbook
- one-hundred page annotated bibliography of SI and VSI publications
- copy of the new SI Supervisor directory.

Please return the survey by February 14, 1999 using the postage paid reply envelope. The surveys can also be sent by FAX to (816) 235-5156.

In the event that your survey has been misplaced, a replacement is enclosed. If you have any questions, please call me at (816) 235-1197. My email address is arendaled@umkc.edu.

Your cooperation is greatly appreciated.

At your service,

David R. Arendale
National Project Director for Supplemental Instruction

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Phone: 816 235-1178

Supplemental Instruction (UMKC Program)
Phone: 816 235-1166

Video-Based Supplemental Instruction
Phone: 816 235-1179

Upward Bound
Phone: 816 235-1115

February 15, 2000

Dear Colleague:

Thank you for your assistance during the past year with completing the national survey concerning Supplemental Instruction. The entire known population of U.S. learning assistance programs that use SI was selected for this study. A questionnaire was sent to every person who had attended a multi-day SI Supervisor training workshop. The questionnaire produced data for four criterion variables and fourteen predictor variables. The data was analyzed through t-tests and correlation studies. Approximately half of those mailed the survey returned it. Of those that returned a survey: 78% had active SI programs, 15% had SI programs temporarily discontinued but planned to resume within 12 months, and 7% of respondents had permanently discontinued SI.

Enclosed with this cover letter are the items that you requested to be sent as our way of saying thank you for completing the survey.

It will still be some time before final analysis of all data is completed. I will post results to the SI homepage when they are available: http://www.umkc.edu/cad/si/ In addition, staff from the Center will be sharing parts of the research at upcoming regional and national conferences.

You participation in the survey was very helpful. Many valuable lessons will be learned through careful review of the research. I also learned some important lessons regarding research design and construction of surveys. We plan to conduct the national survey every couple of years. I hope that you can participate again in the future.

If you would like to visit with me about this matter, please contact me at (816) 235-1197 or by E-mail at arendaled@umkc.edu Thank you again for your assistance.

At your service,

David R Arendale

David R. Arendale
Interim Director

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APPENDIX B

SURVEY INSTRUMENT

Supplemental Instruction Program Survey, *Revised November 20, 1998*

Survey Purpose. This is the first comprehensive national survey of SI. We will share the summary data generated through this survey at the 1st National SI Conference (Kansas City, May 20-22, 1999) and through several major publications. We will not reveal individual responses of this survey to anyone outside the National Center for SI at UMKC. We will summarize your individual responses with other survey responses when data is revealed through publications or presentations (examples: all survey respondents, two-year public institution survey respondents, etc).

Appreciation for Survey Completion. Thank you for completing this survey. To show our appreciation for return of the survey, you may receive a summary of the data collected, a copy of the one hundred page annotated bibliography of all SI and VSI publications, and the most recent SI Leader Training Workbook.

Institution Contact Information. Please complete or revise the following information so that UMKC can update its mailing list of persons who have attended SI Supervisor training workshops.

First name: Last Name: Title (Mr., Mrs., Ms., Dr.):

Job Position Title:

Institution Name:

Street Address 1:

Street Address 2:

City: State/Province: Zipcode: Country:

Office Telephone Number: Office FAX Number:

Personal Email Address:

Campus SI Program Information Internet Web Address:

Section One: General Background Information About the SI Program

1. What is the status of the SI program at your institution? (Please check only one.)

☐ Active (Offer SI in at least one course each year). ***Please skip questions #2 and #3 and answer the rest of the survey questions beginning with #4.***

☐ Preparing to offer SI in a course for the first time on campus during the next twelve months or less. ***Please return the survey at this point. Thank you for your help with this research.***

☐ Temporarily Inactive (Was active at one time, but SI program will begin again during the next twelve months). ***Please skip questions #2 and #3 and answer the rest of the survey questions beginning with #4.***

☐ Discontinued (SI program was active at one time, but now permanently discontinued). ***Please skip question #2 and answer the rest of the survey questions beginning with #3. Base your answers when the SI program was active.***

☐ Never offered SI in a course and do not plan to do so. ***Please answer question #2 and then return the survey. Thank you for your help.***

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2. If you indicated that the SI program was "never offered," please list the reason(s): (Please check all boxes that apply.)

- ☐ Did not obtain institutional funds.
- ☐ Did not obtain grant funds or support from outside sources.
- ☐ Reallocated funds to another academic support or student retention program.
- ☐ Person originally trained to be SI Supervisor is no longer in that position.
- ☐ After attending SI Supervisor training workshop, decided that SI was not appropriate for the institution.
- ☐ After attending SI Supervisor training workshop, decided to choose another program instead of SI
- ☐ Unable to obtain faculty support to offer SI in their courses.
- ☐ Lack of time to supervise SI program because of other work commitments.
- ☐ Other. Please describe:

____

____

____

3. If you indicated that the SI program was "discontinued," please list the reason(s): (Please check all boxes that apply.)

- ☐ Reduction in funds (example: budget reduction, loss of grant funds).
- ☐ Person originally trained to be SI Supervisor no longer in position.
- ☐ Reallocated funds to another academic support or student retention program.
- ☐ SI program results were disappointing.
- ☐ Low student utilization of the SI service.
- ☐ Lost faculty support to allow SI to be offered in their courses.
- ☐ Lack of time to supervise SI program due to other work commitments.
- ☐ Other. Please describe:

____

____

____

4. Where is (or was) the SI program located administratively within the institution? What area is (or was) at the top of the administrative hierarchy over the SI program? This administrative area reports directly to the college president or chancellor.
(Please check only one box.)

- ☐ Academic affairs
- ☐ Student affairs
- ☐ Joint reporting responsibility to both academic and student affairs
- ☐ Enrollment management
- ☐ Other. Please describe:

____

____

5. What is the title of the person who the coordinator of the SI program reports to?

- ☐ Director of the learning assistance or developmental education department
- ☐ Academic department chairperson
- ☐ Assistant or associate dean
- ☐ Dean
- ☐ Asst. or assoc. vice chancellor or vice president
- ☐ Vice chancellor or vice president
- ☐ Other. Please describe:

____

6. What job responsibilities do you as the respondent to this survey hold at the institution: (Please check all boxes that apply.)

- ☐ Serve as the main campus SI Supervisor
- ☐ Help supervise the campus SI program
- ☐ Teach full or part-time at the institution
- ☐ Supervise the center or department that provides student academic assistance
- ☐ Coordinate the academic tutor program
- ☐ Coordinate academic assessment for the campus
- ☐ Supervise other faculty members who teach developmental education courses
- ☐ Academic advisor
- ☐ Graduate Student
- ☐ Chairperson of an academic department
- ☐ Other. Please describe:

____

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7. What is the average amount of time spent by the main campus SI Supervisor over the entire academic term supervising the campus SI program? SI supervision may include the following activities: training SI leaders, observing SI leaders during SI sessions, communicating with faculty members, conducting research studies, etc.

- ☐ Less than 5 percent of his or her time (average 2 hours a week)
- ☐ Between 6 and 10 percent of his or her time (average 3 to 4 hours a week)
- ☐ Between 11 and 20 percent of his or her time (average 5 to 8 hours a week)
- ☐ Between 21 and 40 percent of his or her time (average 9 to 16 hours a week)
- ☐ Between 41 and 60 percent of his or her time (average 17 to 24 hours a week)
- ☐ Between 61 and 80 percent of his or her time (average 25 to 32 hours a week)
- ☐ More than 81 percent of his or her time (average 33 or more hours a week)

8. What was the first year that the SI program was active at the institution? __________

9. What was the last year that the SI program was active at the institution? __________
If the SI program is currently active, please write "active."

10. Estimate the number of classes that had SI support during the past twelve months? _____
If one SI leader provided academic support to students in three sections of the same class in the same academic term, count that as three classes. If the same class was supported during fall, winter, and summer academic terms, count that as three classes.

11. SI has been offered in the following levels of courses at your institution: (Please check all boxes that apply.) This question is asking about the types of courses served since the SI program was started. These courses may not be currently served by the SI program.

- ☐ Lower-division courses (first-year and sophomore college students).
- ☐ Upper-division courses (junior and senior college students).
- ☐ Graduate school courses (example: Master's, Education Specialist, Doctorate).
- ☐ Professional school courses (example: medicine, pharmacy, dentistry, law).
- ☐ High school credit courses (high school students).
- ☐ College credit courses for high school students.
- ☐ Other. Please describe:

____

____

12. If the SI program has been modified from the basic Kansas City model, please describe how it was revised: (Please check all boxes that apply.)

- ☐ Students receive extra academic credit in the content course for attending SI sessions.
- ☐ Students enroll in an additional course and receive a grade or pass/fail for attending SI sessions.
- ☐ SI attendance is mandatory for all students. Please describe:

____

____

- ☐ SI attendance is mandatory for some students. Please describe:

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- ☐ The SI program is called by another name than "Supplemental Instruction." Please share the name chosen and the reason for selecting it:

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- ☐ Other ways that the SI program was modified:

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Section Two: SI Program Outcomes

Various ways are used to evaluate outcomes of a campus SI program. The following questions ask you to share data about several outcomes of your institution's SI program. These questions ask you to base your answers on the last academic term that SI was offered on campus (i.e., fall, winter, spring). ***Do not*** base answers on data from the summer academic term. **Use your best estimates for each of the questions.**

13. How often is the SI program evaluated in terms of final course grades of SI participants and nonparticipants?

- ☐ SI program has never been evaluated in terms of final course grades of SI participants and nonparticipants. ***Please skip questions #14 and #15 and begin again with question #16.***
- ☐ SI program was evaluated the first academic term that it was offered, but has not been evaluated since then.
- ☐ SI program is evaluated every couple of years.
- ☐ SI program is evaluated every couple of academic terms.
- ☐ SI program is evaluated every academic term that the SI program is offered.

14. What is the average mean final course grade difference between SI participants and nonparticipants? *Estimate* an average difference based on the campus SI program results during the last academic term that SI was offered. From the mean final course grade of SI participants subtract the mean final course grade for nonparticipants. (Example: SI group 3.2 minus Non-SI group 2.7 equals +0.5). This question assumes that the institution uses a 0.0 to 4.0 grading scale. Please indicate if a different grading system is used by the institution.

The resulting grade difference is: ______

Institution uses other than a 0.0 to 4.0 grade scale:

Please describe:____________________________

____

15. What is the difference in average mean combined percent of D and F final course grades and course withdrawals between SI participants and nonparticipants? ***Estimate*** an average based on the campus SI program results for the past academic term. From the mean percent of D, F and class withdrawals for non-SI participants subtract the mean percent of SI participants (Example: Non-SI group DFW rate of 35% minus SI group DFW rate of 16% equals +19%).

The resulting percent difference is: _____

16. What is the average mean percent of students in the class who participate in SI one or more times? This is an *estimated* average based on all classes that had SI support during the last academic term that SI support was offered.

_____**% of students participated in SI.**

17. What is your overall satisfaction level with the campus SI program in meeting local institutional needs?

- ☐ Very dissatisfied
- ☐ Dissatisfied
- ☐ Somewhat dissatisfied
- ☐ Somewhat satisfied
- ☐ Satisfied
- ☐ Very Satisfied

Please share the basis for your choice of satisfaction level with the campus SI program.

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18. Which of the following would raise your satisfaction level of the SI program at your institution as recorded in Question #17? (Please check all boxes that apply.)

- ☐ Change the administrative location of the SI program (example: reassign from academic affairs to student affairs).
- ☐ Offer SI in more classes.
- ☐ Offer SI in fewer classes.
- ☐ Have more release time in my current work assignment to manage the SI program.
- ☐ Have more part or full-time staff support to manage and supervise the SI program.
- ☐ Have more students attending the SI sessions.
- ☐ Other. Please describe:

____

Section Three: SI Program Activities

Respondents are encouraged to answer the questions below based on the common experience at their institution. The UMKC SI training staff assumes that many SI programs experiment during some academic terms and with some targeted SI classes. Rather than focusing on the exception, what is the most common experience at the institution regarding the following activities?

19. What is the class attendance pattern of the SI leader regarding the targeted class for SI service?

- ☐ SI leader neither attends the targeted SI class nor frequently talks with the SI class professor.
- ☐ SI leader never attends the targeted SI class but talks frequently with the SI class professor concerning what is occurring during class.
- ☐ SI leader attends the SI class once a week.
- ☐ SI leader attends most SI class sessions each week.
- ☐ SI leader attends all SI class sessions each week.

20. How much training is provided for the SI leader before the beginning of the academic term in which he or she serves as SI leader for the first time? Training could be formal, informal, or one-on-one.

- ☐ SI leader receives no specific training before the academic term.
- ☐ SI leader receives no specific training before the academic term *except* to read some print materials or view videotapes regarding SI.
- ☐ SI leader receives between one and five hours of training before the academic term.
- ☐ SI leader receives between six and eight hours of training before the academic term.
- ☐ SI leader receives between nine and sixteen hours of training before the academic term.
- ☐ SI leader receives seventeen or more hours of training before the academic term.

21. How much training is provided for the SI leader during the academic term that he or she serves as SI leader? This is for either new or experienced SI leaders. Training could be formal, informal, or one-on-one.

- ☐ SI leader receives no training during the academic term.
- ☐ SI leader attends training sessions several times during the academic term.
- ☐ SI leader attends training sessions held monthly during the academic term.
- ☐ SI leader attends training sessions held every two weeks during the academic term.
- ☐ SI leader attends training sessions held every week during the academic term.

22. To what degree does the SI program use the SI Leader training manual provided by the UMKC SI staff or one of the SI Certified Trainers to train your institution's SI leaders? The SI Leader training manual is provided to workshop attendees during the multi-day SI supervisor training workshop held by a trainer from the UMKC SI staff or one of the designated SI Certified Trainers.

- ☐ Do not use any part of it for training SI leaders. Materials created by the SI supervisor or obtained commercially are only used.
- ☐ Use between 1 and 25 percent of the UMKC SI Leader manual.
- ☐ Use between 26 and 50 percent of the UMKC SI Leader manual.
- ☐ Use between 51 and 75 percent of the UMKC SI Leader manual.
- ☐ Use between 76 and 100 percent of the UMKC SI Leader manual.

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23. How many times does someone attend SI sessions and observe first-time SI leaders during the academic term and then provide helpful feedback to them? The observer may be the SI Supervisor, Assistant SI Supervisor, or a veteran SI leader. If someone else, please note below.

- ☐ No one observes SI leaders during the academic term.
- ☐ SI leaders are observed once or twice by someone during the academic term.
- ☐ SI leaders are observed three to five times by someone during the academic term.
- ☐ SI leaders are observed six to nine times by someone during the academic term.
- ☐ SI leaders are observed ten or more times by someone during the academic term.
- ☐ Other. Please describe:

____

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24. How many times does someone attend SI sessions and observe experienced SI leaders during the academic term and then provide helpful feedback to them? The observer may be the SI Supervisor, Assistant SI Supervisor, or a veteran SI leader. If someone else, please note below. "Experienced" SI leaders have previously served as a SI leader for one or more academic terms.

- ☐ No one observes SI leaders during the academic term.
- ☐ SI leaders are observed once or twice by someone during the academic term.
- ☐ SI leaders are observed three to five times by someone during the academic term.
- ☐ SI leaders are observed six to nine times by someone during the academic term.
- ☐ SI leaders are observed ten or more times by someone during the academic term.
- ☐ Other. Please describe:

____

____

25. What is the preparation background of the person who directly supervises the SI program on a day-to-day basis? "Attending an SI supervisor workshop" means the person attended a multi-day SI supervisor workshop held by UMKC SI staff or one of the SI Certified Trainers. If your campus has multiple supervisors, what is the *most frequent* background of that person?

- ☐ SI program supervisor has not: (1) read any SI materials, (2) received training by someone who had attended a SI supervisor training workshop, (3) nor personally attended a SI supervisor training workshops.
- ☐ SI program supervisor has read SI materials and was trained by someone who had not attended a SI supervisor training workshop conducted by a member of the SI training staff from Kansas City or one of its official SI Certified Trainers.
- ☐ SI program supervisor has read SI materials but has not: (1) received training by someone who had attended a SI supervisor training workshop nor (2) personally attended a SI supervisor training workshops.
- ☐ SI program supervisor has read SI materials and was trained to do the job by someone else who had attended a SI supervisor training workshop.
- ☐ SI program supervisor attended an SI supervisor training workshop conducted by a member of the SI training staff from Kansas City or one of its official SI Certified Trainers.

26. What is the typical academic background of the students who are encouraged to attend SI sessions during the academic term? This encouragement may be provided by the SI leader announcements, SI publicity, and messages by the class professor who has SI attached to his/her class.

- ☐ SI program is reserved exclusively for students who are required to attend since they have earned low college grades, or for students the institution predicts may have academic difficulty in the targeted class. If this SI program design is based on such requirements (i.e., federal TRIO grant), please describe here:

____

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- ☐ SI program is promoted primarily for students who are earning low college grades, or for students the institution predicts may have academic difficulty in the targeted class. Other students in the class may attend the SI sessions as well.
- ☐ SI program is promoted primarily for students who are earning low or average college grades, or for students the institution predicts may earn those grades in the targeted class. Others students in the class may attend the SI sessions as well.
- ☐ SI program is promoted for all students in the targeted college class.
- ☐ SI program is promoted as an honor or enrichment program primarily for students considered to be the most academically capable in the class. Other students in the class may attend the SI sessions as well.

27. What is the typical academic background of the person who serves as the SI leader in the class? This is the common profile of most SI leaders.

- ☐ SI leader is a lower, upper or graduate level college student or community person who has never been enrolled in the class in which he or she serves as a SI leader.
- ☐ SI leader is a lower, upper or graduate level college student who is currently enrolled in the same class as the one that he or she serves as SI leader.
- ☐ SI leader is a lower, upper or graduate level college student who previously completed the same class as the one that he or she serves as SI leader.
- ☐ SI leader is a graduate student who previously completed the same class as the one that he or she serves as SI leader.
- ☐ SI leader is a college professional staff or faculty member who may or may not have completed the same class as the one that he or she serves as SI leader.
- ☐ Other. Please describe:

____

____

28. What are the most frequently used activities the SI leader utilizes during SI sessions?

- ☐ SI leader makes no preparation for SI sessions and limits involvement to encouraging the other students to discuss class-related issues with each other.
- ☐ SI leader only redirects questions and facilitates the discussion by guiding the students to engage in SI session activities (Examples: informal quiz, lecture note review, predicting exam questions).
- ☐ SI leader redirects questions, facilitates the discussion, and shares class content information along with other SI participants.
- ☐ SI leader redirects questions, facilitates the discussion, shares content information along with other SI participants, and integrates sharing their personal experience of applying study strategies with the class content material.
- ☐ SI leader redirects questions, facilitates the discussion, shares content information along with other SI participants, integrates sharing of study strategies along with the content material, and gives short (example: five to ten minute) mini-lectures on study strategies.
- ☐ SI leader often spends most of the SI session to relecture the content material provided by the class instructor at the previous class lecture session.

29. What is the average interest or participation level of instructor or professor who has the SI program attached to his or her class?

- ☐ The class instructor is not asked before the academic term regarding his or her interest in having SI sessions offered in connection with the class.
- ☐ Even if the class instructor does not want SI sessions offered in connection with his or her class, SI may be offered for the class based on a decision by others (example: department chair, academic dean, director of learning assistance center).
- ☐ SI sessions are only offered in classes where the class instructor is mildly to moderately supportive of the SI program.
- ☐ SI sessions are only offered in classes where the class instructor is highly supportive of the SI program.
- ☐ SI sessions are only offered in classes where the class instructor is highly supportive of the SI program and is actively involved with the SI program by meeting regularly with the SI leader to help them prepare for SI sessions (Examples: review SI session worksheets, suggest or review questions for practice exams, etc).

30. When do SI sessions begin to be offered to enrolled students in the targeted class?

- ☐ SI sessions are offered beginning the first week of the academic term.
- ☐ SI sessions are offered beginning the second week of the academic term.
- ☐ SI sessions begin after the second week of the academic term, but before the first major examination by the instructor in the class.
- ☐ SI sessions begin after the first major examination of the academic term.
- ☐ SI sessions begin after the middle of the academic term.

31. How many SI sessions are offered on average each week for each class during the academic term? Only include classes that have two or more lecture sessions each week. Include all SI sessions offered, even if students do not attend some of them. *Note:* Sometimes SI leaders offer additional sessions before major exams. Do not include them with this average number of sessions offered weekly throughout the academic term.

- ☐ One SI session is offered each week.
- ☐ Two SI sessions are offered each week.
- ☐ Three SI sessions are offered each week.
- ☐ Four SI sessions are offered each week.
- ☐ Five or more SI sessions are offered each week.

32. As a way to show our thanks to you for completing this extensive survey, please indicate which of the following items you would like to receive. (Please check all boxes that you wish.)

- ☐ Summary of the results from this survey.
- ☐ One hundred page annotated bibliography of publications related to Supplemental Instruction and Video-based Supplemental Instruction.
- ☐ Most recent edition of the SI Leader Training Workbook.

Thank you for completing this survey. Please use the postage-paid reply envelope or fax back to UMKC, ATTN: David Arendale, National SI Project Director at (816) 235-5156.

If you would like to discuss any of the questions, please contact David Arendale via email (Arendaled@umkc.edu) or telephone at 816-235-1197.

APPENDIX C

ANNOTATED BIBLIOGRAPHY OF LITERATURE RELATED TO SUPPLEMENTAL INSTRUCTION

Supplemental Instruction/VSI Annotated Bibliography

Revised November 12, 1999

Editor, David R. Arendale

Note to Reader: When possible, original text from the author's document overview or summary paragraphs were used in this annotated bibliography. If the reader is aware of other SI/VSI publications not included in this document or have suggestions for corrections to the annotations, please contact the compiler/editor (David Arendale), 816-235-1197, E-mail: arendaled@umkc.edu

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Section One: Dissertations and Thesis Papers

Anker, E. O. (1991). Supplemental Instruction: An answer for the at-risk student in a high-risk course? Unpublished Master's of Arts (M.A.T.) thesis, Calvin College, Grand Rapids, MI. Available: Interlibrary loan from Calvin College and Theological Seminary, Grand Rapids, MI.
This research paper studied the use of Supplemental Instruction (SI) during Spring 1991 at Calvin College in Grand Rapids, MI. Areas for study included: final course grades for "at risk" students; and relationships among the level of SI attendance, academic ability, and final course grades. Special admit "at risk" students were the focus of the study. A study skills class was paired with a content course (e.g., History 101) in Fall 1990 to provide academic assistance for students. The at risk students were required to enroll in the non-credit course. Thirteen special admit students from Fall 1990 were enrolled in the paired class. In Spring 1991 seven special admit students instead participated in SI rather than being enrolled in a paired study skills class. There was no significant difference regarding final course grades. Individual SI attendance for SI ranged from three to 17 for the 18 sessions offered during Spring 1991. The mean average was 8.7 sessions. There was a positive correlation between higher levels of attendance and higher academic achievement. The researcher suggested that SI was more helpful to participating students than a paired study skills course.

Ashwin, P. W. H. (1993). Supplemental Instruction: Does it enhance the student experience of higher education? Unpublished doctoral dissertation, Kingston University, London, England
This doctoral dissertation is concerned with the student experience of Higher Education in Britain that is influenced by Supplemental Instruction (SI). The qualitative research study of SI's impact in two classes (Applied Social Science and Computer Science) at Kingston University (UK) included interviews with SI leaders and questionnaires of first year students who were enrolled in the two classes. The purpose of this case study was to examine to what extent the educational theory of SI was matched by the student experience of it. Qualitative research suggests that SI was beneficial to students who took advantage of the service. SI leaders listed the following benefits of the program for themselves: increased confidence, greater sense of community between different years of the course, greater understanding of the material they were facilitating, and increased interest by potential employers because of the cocurriculuar nature of the SI leader experience.

Campbell, M. L. (1994). The cognitive effect of Supplemental Instruction on student achievement in general biology. Unpublished Master's of Education thesis (M.Ed.), Slippery Rock University, PA: Available: Interlibrary loan from Slippery Rock University of Pennsylvania.

Carson, D., & Plaskitt, N. (1994). A descriptive study of the attitudes of first year students at the University of Port Elizabeth toward Supplemental Instruction and evaluation thereof.

Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.
This dissertation study of Supplemental Instruction (SI) was conducted at the University of Port Elizabeth in the Republic of South Africa. The study examined students' perceptions of the effectiveness of SI in helping them to acquire skills such as critical thinking, essay writing, and reading of textbooks. The study surveyed Sociology and Economics students' perceptions of the values of SI and found that students perceived four main reasons why SI is effective: improvement of learning ability; increased interest in the subject; a forum to meet new friends; and SI leader support. A need for greater structure within SI sessions was offered as the most common response for improvement of SI.

Clark, L. R. Outcomes of Supplemental Instruction for History 1310 and 1320 at Southwest Texas State University. Unpublished Masters of Arts Thesis, Southwest Texas State University, San Marcos, TX. Available: Interlibrary loan from Albert B. Alkek Library, Southwest Texas State University, San Marcos, TX.
This study sheds light on the effectiveness of Supplemental Instruction (SI) in achieving student academic goals, enhancing student performance in difficult entry level college classes and impacting the success of students with varying abilities between Fall 1995 and Spring 1997 at Southwest Texas State University in History 1310 and History 1320. SI participants out-performed non-SI participants on the three academic outcomes examined: final course grades (mean grade difference: 2.91 vs. 2.17 and rate of A, B, or C: 95.5% vs. 73.3%), D or F course rates (18.9% vs. 37.0%), and institutional persistence (81.1% vs. 63.0%). SI attendance was defined as attending five or more times during the academic term. SI was equally effective with general (2.91 vs. 2.17), non-traditional (2.89 vs. 2.44) and part-time (2.78 vs. 1.90) populations. This research also indicated minority students participated in SI in greater proportions than non-minority students. A significant cross-over or repeat SI population was found. This research concluded that participation in SI result in higher final course grades and successful course completion; the resulting grade improvement is reflected in improved retention (84.2% vs. 72.6%). The researcher noted that the impact of SI may be understated due to analysis of entry level characteristics of the students that suggest that the SI participants tend to be less academically prepared than the non-SI participants (lower high school rank and SAT scores).

Collins, N., & Ronaldson, A. (1995). Supplemental Instruction: Its effectiveness within the ambit of the Social Work Department of the University of Port Elizabeth. Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.
This dissertation examines the effectiveness of Supplemental Instruction (SI) at the University of Port Elizabeth in the Republic of South Africa. This study replicates findings from a dissertation by Carson and Plaskitt (1994) from the same institution. Two additional reasons were identified by Collins and Ronaldson concerning reasons for

the effectiveness of SI: easy participation in SI sessions and adjustment to university life. They concluded that the focus of SI correlates with the needs of students and that SI has helped students to develop important skills, for example, understanding key concepts, lecture note taking, understanding the textbooks and exam preparation. Depending upon the structure of the course, SI participants reported wanting varying levels of structure during the SI sessions. Some students wanted open agendas for the group to select the areas covered and processes used. Other students reported wanting more structure in the SI sessions from the SI leader.

Davis, E. E. (1999). Student mentors: Experiences of being a Supplemental Instruction leader. Unpublished Master of Science Thesis, Indiana University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
The purpose of this Master Thesis was to examine the experience of serving as a Supplemental Instruction (SI) Leader upon the individual at Indiana University Purdue University Indianapolis (IUPUI). A qualitative research study was conducted of SI leaders during Fall 1997. Some common benefits cited were improved: communication skills, problem solving skills, subject matter knowledge, people skills, friendships, knowledge of campus layout and resources, time management skills, involvement and knowledge of campus activities, leadership skills, and feelings of connection to the campus. Some mentioned that SI opened doors to new experiences that drew them closer to their desired career goal.

Douma, S. R. (1988). Supplemental Instruction: An alternate approach. Unpublished master's thesis (M.S.), Mankato State University, Mankato, MN. Available: Interlibrary loan from Mankato State University, Mankato, MN.
This Master of Science thesis study from 1986 had two purposes. The first was to provide a descriptive review of the Supplemental Instruction (SI) program (e.g., program overview, SI leader training program). The second purpose of the study was to evaluate the effects of SI at Southwest State University (MN) during Fall 1986, Winter 1987 and Spring 1987. Between 36 to 42 percent of students participated in the SI program. Findings include the following: 1) SI participants earned a higher final course grade. F86, 2.34 vs. 2.01, W87, 2.31 vs. 2.01, S87, 2.55 vs. 2.04. 2) SI participants earned a higher rate of A and B final course grades. F86, 42% vs. 31%, W87, 41% vs. 35%, S87, 54% vs. 36%. 3) SI participants earned a lower rate of D and F final course grades or withdrawals: F86, 21% vs. 33%, W87, 21% vs. 35%, S87, 19% vs. 35%. Several data tables from an article by Blanc, DeBuhr, and Martin (1983) are reproduced in this report. Individual course reports from Southwest State University that were used to generate the previous summary research studies are included: Natural Science, Biology I, Food for Thought, Everyday Chemicals, Accounting I, Introductory Algebra, Business Statistics I, General Psychology I, A.C. Circuits, Critical Thinking, and General Biology II.

Eberling, D. J. (1998). A comparison of the effectiveness of study strategies instruction with community college students (Doctoral dissertation, Ph.D., University of Houston, 1998). *Dissertation Abstracts International, 59*(03), 705A
College students who use study strategies effectively are more successful in school than are those who are unaware of study strategies, or who use such strategies infrequently. There is a relationship between poor performance in school and inadequate study strategies. Fortunately, study strategies can be taught. The purpose of this dissertation study was to investigate the relation between grade point average and study habits and attitudes. Also, to examine the effectiveness of a study strategies course and the Supplemental Instruction (SI) program with community college students ' study habits and attitudes. Volunteers for the study completed a pre and post test of the Survey of Study Habits and Attitudes (SSHA). Small sample size (n=10) may have played a role in clouding results of the research. Most students refused to participate in the study by permitting access to course grades and other vital information variables. With this SI program, attendance in SI sessions was not tracked and therefore the quantity of SI attendance was not available as an independent variable which has been used with many other published studies. With the small remaining group of voluntary study participants, a comparison of the students' grade point average and scores on the SSHA did not reveal significance. The scores on the SSHA and the comparison between the study strategies course and the SI program revealed no significant difference between the treatment groups.

Edelson, M. (1996). *A student's experience of the Supplemental Instruction programme and the first year of university: A case study*. Unpublished doctoral dissertation, University of Port Elizabeth, Port Elizabeth, Republic of South Africa.

Fisher, J. E. (1997). Effects of Supplemental Instruction on undergraduate academic achievement, motivational orientation, and learning strategies (Doctoral dissertation, Ph.D., Auburn University, 1997). *Dissertation Abstracts International, 58*(10), 3831A
Examined in this dissertation study were the effects of participation in a Supplemental Instruction (SI) program on student academic achievement, motivational orientation, and learning strategies in a core psychology course at Auburn University. Participants in this study were 381 undergraduate students divided into one treatment and two comparison groups. Students in the treatment group participated in SI outside of regular class time once a week for 9 weeks. Both the treatment and comparison groups were administered four items: a course content knowledge pretest, the Halpin and Halpin Demographic Survey (1996), the Motivated Strategies for Learning Questionnaire (1994), and a course content knowledge posttest. Both the pretest and posttest were teacher-made tests assessing knowledge of course content. An initial cross-tabulation frequency distribution followed by a chi-square supported the assumption that the two groups were equal on course entry demographic variables. An analysis of variance (ANOVA) conducted with pretest scores revealed that there were no significant differences across groups in pre-entry content knowledge prior to the treatment. Once

the study was completed, a multivariate analysis of variance (MANOVA) was conducted revealing that there were differences between the groups. On two variables, peer learning and help seeking, significant differences were found in favor of the SI treatment group. The groups did not differ on the other motivation and learning strategies subscales or on the posttest measuring academic achievement. Several research design features were unusual with this study. Most SI studies limit possible variables that might influence student achievement. Therefore, most research designs limit analysis to a single course, one course instructor, one SI leader, analysis of actual course grades, and provide no additional academic enrichment activities in the class. Numerous limitations were listed by the researcher in the dissertation. 1) The actual final course grades of the students were not used, but rather a teacher-made posttest that was one part of the final course grade. 2) To increase sample size, additional sections of the same course were added to the study even through SI was not available to them and the course sections were taught by other professors who may employ different approaches to the curriculum, grading, and instructional delivery. 3) Ten SI leaders were employed in one course section. 4) All students in the course also participated in mandatory discussion sessions conducted each week. Fifteen graduate teaching assistants conducted these sessions in the three course sections. 5) All students who scored high on the course pretest were given an "A" final course grade and were dismissed from the course. This excluded their potential involvement in SI sessions and providing additional successful student modeling other than the SI leader. 6) Students were not allowed to attend SI sessions more than once a week. Students who needed additional help were denied the assistance. 7) Since the pre/post test was teacher-made, there is no way to judge its validity as an instrument. 8) The final exam was optional for students. If students already had an "A" average, they could skip the exam, therefore they were then excluded from the study. Students who needed a few points to earn a "B" only needed to correctly answer enough questions on the posttest exam to earn a "B" final grade, even though they might have earned a "D" or "F" on the final exam.

Hibbert, T. D. (1996). Taking study skills to the classroom: Supplemental Instruction as an integral part of college courses. Unpublished Master's of Arts (M.A.) thesis, University of Texas at El Paso. Available: Interlibrary loan from the University of Texas at El Paso. This paper studied the impact of Supplemental Instruction (SI) at the University of Texas at El Paso during Fall 1994 and 1995 in three Sociology Statistics classes and three Sociology Methods of Research classes with a total student enrollment of 269 students. These sections were chosen since the same instructor taught the three sections in each subject -- controlling for the possibility of different teaching styles. The three dependent variables studied were final course grade, semester grade point average, and re-enrollment at the university the following academic term. The classes included in this study had D, F or withdrawal rates of 32 to 38 percent before providing the SI program. During Fall 1994 the researcher conducted a mandatory study session connected with each section of the sociology classes. These mandatory sessions occurred during one class period each week. In one course section the researcher conducted a traditional SI session. In the other section of the same course the researcher allowed the enrolled students to guide the session. The researcher served as a discussion facilitator. The results were mixed regarding the improvement of semester grade point averages. In the statistics course the SI group had a higher subsequent semester GPA (2.86 vs. 2.57). In the methods course the results slightly favored the non-SI group (1.98 vs. 1.90). The same pattern emerged regarding final course grades. In the statistics course the SI group had higher academic performance (percent A & B, 41.3% vs. 32.6%; D, F & W, 32.0% vs. 30.4%; mean final grade, 73.66 vs. 72.2). In the methods class the non-SI group had higher achievement (percent A & B, 55.0% vs. 48.9%; D, F, & W, 20.0% vs. 26.5%; mean final grade, 76.4 vs. 73.8). An abbreviated version of the Whimbey Analytical Skills Inventory (8 items rather than 38) and a math assessment test was administered to all students at the beginning and the end of the academic term. No significant differences were found. Analysis of student journals suggested increased confidence and enjoyment of the course content due to the experience of the supplemental study review sessions provided through both the traditional SI and the informal student-led sessions. The researcher postulated several possible reasons for no significant difference between the SI group and the informal student study groups: (1) since the same person facilitated the SI sessions and the informal student study group (non-SI) some SI activities may have been utilized during the non-SI group sessions; (2) the SI facilitator also provided additional tutorial help to the non-SI group throughout the academic term.

Hodges, R. B. (1997). The effect of self-monitoring strategies and verbal prompts on high-risk students' attendance in tutoring and Supplemental Instruction and their academic achievement (Doctoral dissertation, Ed.D., Grambling State University, 1997). Dissertation Abstracts International, 59(02), 0429A
The study investigated the effect of high-risk students' self-monitoring (SM) strategies and instructors' use of verbal prompts on high-risk students' attendance in tutoring and Supplemental Instruction (SI) and on their academic achievement. Subjects consisted of 103 conditionally admitted contract students at Southwest Texas State University during fall 1996. Using an experimental posttest-only control-group design, instructors in four freshman seminar classes implemented different combinations of treatment. In Treatment 1, subjects were required to self-monitor their attendance in tutoring and SI, and they received verbal prompts from their instructors to attend free tutoring and SI. In Treatment 2, subjects were required to self-monitor their attendance in tutoring and SI but were not given verbal prompts. In Treatment 3, subjects received verbal prompts to attend tutoring and SI but were not required to self-monitor their attendance. In the control group, subjects were not required to self-monitor their attendance in tutoring and SI and were not exposed to verbal prompts. A validation analysis of the effectiveness of tutoring and SI compared subjects attending one or more tutoring sessions and one or more SI sessions to those not attending. Using independent t-tests, the results indicated no significant group differences occurred in semester GPA between attendees and nonattendees in tutoring but did find statistically significant group difference in semester GPA for attendees in SI. Three hypotheses examined the relationship between subjects'

use of SM strategies and instructors' use of verbal prompts on subjects' attendance in tutoring and SI. Two ANOVAs failed to reject the three null hypotheses which indicated that there was no increased in subjects' attendance in tutoring and SI between groups. SI attendance for this subpopulation of students was low (mean=2.27 with S.D.=3.37) when compared with national SI data studies. The researcher suggested the following reasons for low SI attendance based on student surveys and interviews: SI sessions scheduled at time in conflict with other student commitments; high-risk students have unrealistic positive perceptions regarding their own academic skills and may not seek help; and high-risk students need stronger external influences to change their behavior including the requirement of mandatory SI attendance. The researcher suggests increased attention to the affective domain and its possible impact upon student learning and the use of mandatory attendance in academic enrichment programs such as SI and tutoring.

Jarvi, S. W. (1998). A quantitative and qualitative examination of Supplemental Instruction and its relationship to student performance (collaborative learning, academic support) (Doctoral dissertation, Ph.D., The University of Connecticut, 1998). Dissertation Abstracts International, 59(05), 1484A
Academic support programs are well entrenched on virtually every college campus. These programs have not always been warmly received, however, and their place on many campuses is a source of constant debate. They have to be evaluated effectively and often to determine if they are achieving their intended goals and contributing to the overall mission of the institution. Supplemental Instruction (SI) is one example of a support program because it utilizes peers to foster a collaborative learning environment and targets high risk classes as opposed to high risk students. Quantitative and qualitative methodologies were employed in this study. The sample for the quantitative component included 2,295 cases of a student completing 1 of 12 introductory level Biology or Chemistry courses in which SI was offered at a large New England Research University. From the total sample, 860 students attended at least one SI session. Qualitative techniques were employed to collect data from both participants and non-participants of SI during one semester. Direct regression where the independent variables of Scholastic Aptitude Test scores, cumulative grade point average, semester standing, and level of SI participation. The dependent variable was student performance in the class as measured by average exam scores. Analyses of data found that in 7 of 12 classes involved, level of participation in SI explained a significant additional amount of variation in exam scores with accompanying large effect sizes. Qualitative findings revealed core categories related to why students attend SI: belief that SI attendance helps to raise test scores; SI sessions were fun and made participants feel more comfortable; students liked SI since it gave an opportunity to work in teams with other students; enabled attendees to stay academically competitive; and sometimes SI sessions compensated for poor lectures. The two major reasons for students not participating in SI were that time constraints precluded attendance and the other reason was a belief that SI attendance was unnecessary.

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Kastelic, J. (1997). Adjunct study skills: An integrated, student-centered approach to learning in community college. Unpublished Master's of Arts (M.A.) thesis, University of San Francisco.

This research report describes one academic study skills program offered at a community college in northern California. It presents a variety of data to show how this integrated, student-centered, collaborative-based adjunct program affected the immediate and long term academic performance and study behaviors of its multicultural, multilingual participants. Students who enrolled in the target course in political science and concurrently completed its corresponding adjunct course over a three quarter period participated in this study. The adjunct course (Skills 130A/PS) was a variation of the Supplemental Instruction (SI) model. Students must attend at least seven weekly sessions and complete four independent study skills labs. SI leaders facilitate the adjunct course which carries academic credit and can generate extra credit points for the linked political science course (Political Science 1). A qualitative and quantitative study was conducted. The students enrolled in linked adjunct course earned higher rates of A & B final course grades, lower rates of D, F & W grades, and increased levels of study skills abilities as compared with students who did not enroll in the adjunct course.

Kenney, P. A. (1989). Effects of Supplemental Instruction (SI) on student performance in a college-level mathematics course (Doctoral dissertation Ph.D., The University of Texas at Austin, 1988). Dissertation Abstracts International, 50(02), 378A. (University Microfilms, No. 8909688).

This doctoral dissertation describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then chosen as a more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership. Controlling for exposure, it was suggested that these gains were due to the benefits of SI, not to the increased exposure of the group to course material. To investigate any residual effects from the SI program, the students from the initial study were tracked for an additional semester. Results from the follow-up study showed that students who had experienced SI had a pattern of fewer F grades in and withdrawals from the second-semester business calculus course. Of the 26 students who failed or withdrew from the original calculus course, former SI participants were more likely to immediately reenroll in the course (six students) than the non-SI participants (one student). Another study focused on the academic performance of SI and non-SI participants in a succeeding academic term in courses where SI was not offered. Former SI participants earned no F grades or withdrew from the second-semester business calculus course. The former SI participants earned a slightly higher mean final course grade (2.63 vs. 2.48), though it was not a statistically significant difference. The researcher speculates that the absence of SI with the second calculus course may had a bigger impact on former SI participants -- narrowing the positive difference in academic achievement with the control group -- since a support service which they were used to accessing was not available in the next course in the sequence.

Kotze, G. S. (1994). Essentials of a program for Supplemental Instruction as academic support for technikon students in mathematics courses at entry-level. Unpublished doctoral dissertation, Faculty of Education (Department of Diadactics) at the University of the Orange Free State, Bloemfontein, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA .
This Doctor of Philosophy dissertation is focused on the effectiveness of Supplemental Instruction (SI) with postsecondary students in entry-level mathematics courses at an institution in the Republic of South Africa. The SI model was evaluated regarding its effectiveness with providing the necessary psychological, philosophical, educational, and sociological components that can contribute towards successful mathematics mastery. Through qualitative and quantitative evaluations, the SI model was found to support increased academic achievement and mastery of mathematical concepts.

Lilley, L. L. (1997). Retention of racial-ethnic minority students within Virginia baccalaureate schools of nursing (nursing education) (Doctoral dissertation, Ph.D., George Mason University, 1997). Dissertation Abstracts International, 58(07), 3559B
The purpose of this dissertation research study was to examine the relationship between retention strategies and retention rates of racial-ethnic minority baccalaureate nursing students attending public universities and colleges within the State of Virginia. Tinto's Model of Student Departure was used as the framework for the study. A cross-sectional one-part mailed survey design was used for this study. A descriptive methodology was used to summarize and describe the data. Qualitative comments were also analyzed for

themes about retention. Statistically significant findings included: lack of close tracking of retention of racial-ethnic minority students by the schools; no statistical significance between the variable of retention problems and the variables of tutoring for racial-ethnic minority students; and fewer than 37% of the schools had Supplemental Instruction or related programs available at the department or school level, although they may have been offered elsewhere on campus.

Maloney, R. S. (1992). The Supplemental Instruction program as an alternative field experience for secondary education majors. Unpublished undergraduate honors thesis (Bachelor of Science with Honors in Education), University of New Orleans, LA. Available: Interlibrary loan from the University of New Orleans, LA.
The College of Education at the University of New Orleans, LA (UNO) requires all education majors to complete twenty five hours of a Professional Laboratory Experience (PLE), which has traditionally been as a teacher aide in an area high school, prior to the student teaching experience. The goal of the PLE is to provide a varied and enriching teaching experience for prospective student teachers. The primary purpose of this study is to study the use of Supplemental Instruction (SI) in College Life sections of English 0150 during Fall 1991 to provide an effective alternative field experience for secondary education majors prior to student teaching. Students were divided into two groups: one group served as SI leaders in the English course and the other group were placed in the traditional high school teacher aide position. Surveys were given to the secondary education majors -- those who completed their PLE at the high school and those who served as SI leaders at the college -- prior to and at the completion of their PLE (course name EDCI 3205) to measure their preparedness to perform specific teaching tasks. The results suggest that there is a greater change in preparedness levels for those who participated as SI leaders in the following areas: lesson preparation (write performance objectives, choose appropriate materials, vary methodology, allocate time for content coverage, construct evaluation instruments, and provide feedback of assessment and evaluation results); classroom management (manage time, mange classroom routines, maintain student engagement, manage task related behavior, and monitor and maintain student behavior); and instructional skills (initiate lessons and activities, provide accurate content information, emphasize essential elements of content knowledge, and implement learning activities at an appropriate pace). The researcher suggested that one of the reasons for the significant gains for the SI leaders was that they had more power to select and experiment with activities. The high school teaching aides were limited by the cooperating high school teacher. Based upon analysis of the data, the researcher suggests that SI can serve as an alternative experience for education majors.

McGinty, D. A. (1990). A path analysis of the effects of multiple programs on student persistence: dormitory residence, orientation, tutoring, Supplemental Instruction (Doctoral dissertation Ph.D., The University of Texas at Austin, 1989). Dissertation Abstracts International, 51(02), 368A. (University Microfilms No. 9016936).
The models of Spady and Tinto depict student dropout as the result of an inadequate

integration into the social and academic systems of the college. This doctoral dissertation research study hypothesizes that persistence for the traditional freshman at a large university is based on background characteristics (gender, ethnicity, rank in high school, aptitude, and college enrolled in) and variables of the academic environment (tutoring, Supplemental Instruction, student orientation, living in residence hall, and grade point average). The model hypothesizes that the academic environment variables have important direct and indirect effects. These four academic programs are described in the literature as promoting student retention. This dissertation researched the effect each program has on student persistence as well as the effect of participation in multiple programs. Path analysis was selected to explain the interactive process of the variables. Multiple regression analysis was used to investigate the strength and direction of the relationships in the path model. It is postulated that the impact of the SI program may have been diminished due to the low number of SI participants (55 of the 560 students in the overall study) which may have clouded results during data analysis. There were moderately significant differences for residence hall, Supplemental Instruction, and the combined effects of orientation and dorm and GPA. SI participants with lower SAT scores performed at academic levels similar to non-SI participants who had higher SAT scores. Further exploratory analyses indicate that the different retention programs have varying effects on students based on ability and past performance levels. The results suggest that retention programs should be targeted at specific populations based on ability and past performance levels.

McGrath, E. T. (1988). Supplemental Instruction: A study of its efficacy on the Greenville College campus. Unpublished master's thesis, Greenville College, IL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
The purpose of this master's thesis study from Fall 1986 and Spring 1987 was to evaluate the effects of Supplemental Instruction at Greenville College (IL) regarding: 1) mastery of course content (SI participants earned a higher final course grade -- 3.16 vs. 2.66 -- and a lower rate of D, F and withdrawal final course grades than nonparticipants (ratio of 3:4); 2) transference of learning skills from one course to another (former SI participants received a higher cum GPA in succeeding academic terms than nonparticipants, 3.14 vs. 2.66); and 3) higher course and institutional retention rates (97 percent for SI participants vs. 83 percent for nonparticipants).

McManus, S. M. (1992). The relationship between Supplemental Instruction and student achievement in university mathematics courses. Unpublished Master's of Science (M.S.) thesis, North Carolina State University at Raleigh. Available: Interlibrary loan from North Carolina State University at Raleigh.
The relationship between Supplemental Instruction (SI) and student achievement during Fall 1990 at North Carolina State University at Raleigh (NCSU) was the focus of this study. The target population was 198 freshmen and sophomore students enrolled in entry-level mathematics courses at NCSU. During the academic term, 60 students

attended one or more times (SI group) while 138 students chose not to attend any SI sessions (non-SI group). Students were enrolled in two sections of Math 241, a second-semester calculus course that was taught by the same professor. The initial section of the paper provides a review of the professional literature concerning SI. The author traces the importance of the following in understanding the unique method of SI: Piaget's constructivism, cooperative learning, student questioning skills, and study strategies. A Pearson Product Moment correlation ($r = -.1771$) and a Multiple Regression Analysis found no significant relationship between the number of SI sessions attended and final course grade. However, students who attended 5 or more SI sessions steadily increased throughout the academic term while the scores of other SI participants fluctuated. The researcher postulates that this suggests the beneficial effect of frequent SI attendance for improving academic performance. A t-test used found that students attending the SI sessions received statistically significantly higher final course grades than those who did not attend (mean final course grade: 86.44 vs. 77.62; $t = 2.95$, $df = 194$, $p < .01$). Following is a comparison between the SI and non-SI groups for each of the course exams. In each comparison the SI group earned higher mean grades: test 1: 76.41 vs. 71.92; test 2: 83.57 vs. 77.01; test 3: 87.57 vs. 79.06; test 4: 83.24 vs. 70.87; test 5: 86.12 vs. 78.82; final exam: 75.31 vs. 67.33; final course grade: 86.45 vs. 77.62. Each comparison was statistically significant except for test 1.

Merwin, D. D. (1991). A comparative analysis of two tutoring methods assessing student achievement and retention (Doctoral dissertation Ed.D., Montana State University, 1990). Dissertation Abstracts International, 52(02), 438A. (University Microfilms No. 9109700).
The purpose of this doctoral dissertation research study was to compare the effectiveness of two tutoring methods with regard to achievement and retention for high-risk undergraduate students at Northern Montana College (Havre, MT) enrolled in English 150 during the 1986-87 academic school year (eleven courses sections over the fall, winter and spring academic terms). English 150 is a three-credit course considered to be developmental in content since it encompassed the basic skills areas (sentence structure, parts of speech, grammar, usage, punctuation, and paragraph development). The two tutoring methods were group tutoring (i.e., Supplemental Instruction, or SI) and individual tutoring. The treatment was randomly assigned to each of the eleven course sections and attendance was mandatory by the students. The problem was investigated by: (1) examining how the tutoring methods and other independent variables affected student achievement and student retention, and (2) comparing the two tutoring methods in terms of cost effectiveness. Achievement was measured by the pretest-posttest gain score from the Tests of Adult Basic Education (TABE). The TABE test for English measured students' competency in capitalization, punctuation, expression, and spelling. Retention was measured by the ratio percentage of the number of student credit hours earned compared to the number of hours attempted for the first and second years following treatment. The cost effectiveness of both tutoring methods was compared by determining the cost of one grade level of improvement. Some of the major findings

were: students in SI tutoring had higher retention rates than students receiving individual tutoring for the first and second years following treatment; the combined results of the two tutoring methods did make a significant difference in student achievement; the SI tutoring method compared to the individual tutoring method was more cost effective ($3.46 average cost for SI program to improve one grade level of one students vs. $16.30 for one-on-one tutoring to do the same); and individual tutoring had a relatively short-term effect. An unexpected finding was that students who participated in SI groups continued to meet at other times outside of class and that the groups were heterogeneous groupings. Interviews with these students revealed that they had met the other students through the SI sessions. It was assumed that students would tend to meet with their own homogeneous affinity groups. The SI students revealed that they enjoyed the social interactions in the groups and felt more comfortable working with other SI participants when they needed additional academic assistance with the English 150 course. The SI program also had an impact upon the SI leaders. Three of the seven SI leaders changed their degrees -- two were business majors and one was a vocational-technical major -- to education so they could become professional teachers. One-on-one tutors reported frustration with the tutoring program when students canceled their scheduled tutoring sessions. Since SI leaders worked with groups, they did not encounter that problem.

Metcalf, K. J. (1996). The impact of the training format on tutors' attitudes, beliefs, values, and practices in college level tutoring (Doctoral dissertation, Ph.D., State University of New York at Buffalo, 1996). Dissertation Abstracts International, 57(09), 3780A There is a lack of empirical data to support which, of several training formats (models), is the best format for training tutors. The purpose of this present dissertation study was to identify which of four training formats produced a positive chance in tutor's attitudes towards tutoring, the tutoring process, and its administration. Accredited Course (AC), Supplemental Instruction Liaison (SIL) Course, Comprehensive Course (CC), and Short Course (SC).A dual methodology was used. In the quantitative study, data was gathered from student-tutors in 30 postsecondary tutor training programs, using a pre and post-test quasi-experimental research design. The College Student Peer-Tutor Survey (CSPTS) was developed to assess whether length or amount of tutor training influenced a positive change in student-tutors' attitudes toward tutoring. The qualitative component of the overall study sought to capture the insights and perceptions of the tutor coordinators/trainers from the 30 tutor training programs in relation to: (a) understanding the programs' organization and instructional content, (b) refining the typology of formats, and (c) developing recurrent themes. As a result of training and experience tutoring, statistically significant changes in tutor's attitudes towards tutoring were evidenced in all four formats. SIL tutors showed more positive change in relation to the importance of "A tutor being an expert in the subject area he/she is tutoring in." Results from the qualitative component of the study focused attention on three recurrent themes: (a) the need for further refinement of the typology of formats, (b) the need for staff development, and (c) the precariousness of program status.

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Peoples, D. M. (1993). Supplemental Instruction: Is it effective? Unpublished Master of Arts (M.A.) thesis, Rowan College of New Jersey: Available: Interlibrary loan from Rowan College of New Jersey.
This Master of Arts Thesis studied the impact of Supplemental Instruction (SI) in 1991-1992 with fifteen 7th and 8th grade junior high school students with a disability enrolled in Overbrook Junior High School of the Lower Camden County Regional High School District Number 1 (NJ). The students were classified either Emotionally Disturbed, Perceptually Impaired or Neurologically Impaired. The students in the study were divided into three groups: those currently receiving SI (CSI) and are mainstreamed in all four of the core academic subject areas; those who previously received SI (PSI) and are mainstreamed in three of the subject areas and only receive resource room instruction; and those who never received SI (NSI) and are mainstreamed in two of the subject areas and only receive resource room instruction. The significance of this study is that SI provides another venue for students with a disability to be educated in the least restrictive environment and be mainstreamed with other students. Departing from the traditional SI model, the following modifications were made to the delivery of the SI program: (1) due to state regulations the SI leader in this study was a certified teacher of disabilities for grades N-12; (2) SI participants were limited to the "at-risk" students with a disability; and (3) due to state regulations the SI groups were limited to no larger than five students. The researcher noted that a common characteristic of SI for traditional college students and the high school students with a disability is that both populations had varying academic ability levels. The CSI students most of the time received higher final course grades than the PSI group, which in turn generally received higher grades than the NSI group. Interviews with parents suggested high satisfaction with the SI program and favored it over the resource room instruction. Students also requested assistance more during the SI sessions than during the resource room instruction. The researcher suggested that the smaller size of the SI sessions in comparison with the resource room instruction was less threatening for students to reveal their needs.

Potts, S. A. K. (1998). Impact of mixed method designs on knowledge gain, credibility, and utility of program evaluation findings (Doctoral dissertation, Ph.D., Arizona State University, 1998). Dissertation Abstracts International, 59(06), 1942A
This dissertation study attempted to understand the relationship between evaluation approach and the perceived knowledge gain, credibility, and utility of findings. Specifically, the researcher investigated whether or not quantitative, qualitative, and mixed-method evaluations produced different kinds and amounts of knowledge gain, different levels of credibility, or suggested different types of use. To investigate this question, the researcher selected a group of consumers of evaluations, presented them with three simulated evaluation case summaries, and interviewed them for their reactions. Participants included ten administrators from academic success and student service programs at Arizona State University. The evaluation case summaries were of a study counseling center, a summer transition program, and a Supplemental Instruction

(SI) program. Each summary highlighted the evaluation's purposes, research questions, data collection methods, findings, conclusions, and recommendations. Participants ranked the mixed-method summary the highest in knowledge gain because it portrayed the most comprehensive picture of program participants, processes, and outcomes. The mixed-method summary was ranked the highest in credibility because it allowed participants to experience the program through the eyes and voices of the students. Participants also ranked the mixed-method summary the highest in utility since it prepared them for such internal administrative responsibilities such as strategic planning, high stakes decision-making, and programmatic improvement. Even though SI was not the primary focus of this study, the findings illustrate the need for careful evaluation of SI programs. The research suggests that SI program administrators should use the mixed-method evaluation system to provide the most helpful and convincing data for policy makers.

Pryor, S. A. (1990). The relationship of Supplemental Instruction and final grades of students enrolled in high-risk courses (Doctoral dissertation EdD, Western Michigan University, 1989). Dissertation Abstracts International, 50(07), 1963A. (University Microfilms, No. 8923554).
The purpose of this doctoral dissertation research study was to determine if there was a significant relationship between attendance at Supplemental Instruction (SI) and final course grades. Unlike some other studies that included SI leaders who were graduate students, community persons, or faculty members, this study only examined SI sessions that were facilitated by undergraduate students. The three science courses at Western Michigan University studied were Animal Biology, Plant Biology, and Introduction to Physics. Attendance at SI was significantly related to final course grades (4.0 grade point scale: 2.64 for SI participants vs. 2.27 for non-SI participants, p< .002), and students who attended SI earned significantly higher final course grades than students who did not attend SI. Even when final course grades were adjusted for composite ACT score, the SI group maintained the half letter grade positive difference. There was also a significant difference in the grade distribution of students who attended SI and students who did not attend SI. The rate of D, F and course withdrawals much significantly lower for the SI group (25% vs. 39%, p< .05). There was a positive correlation between higher levels of SI attendance and higher mean final course grades. Students who attended three or more SI sessions earned a full letter grade higher than the non-SI group (adjusted mean final course grades: zero SI attendance, 2.27; attended SI once or twice, 2.45; attended three to six SI sessions, 3.07; and attended SI sessions seven or more times, 3.10).

Sevos, S. (1991). The effects of Supplemental Instruction on a developmental mathematics course. Unpublished Master's of Science (M.S.) thesis, Kean College of New Jersey. Available: Interlibrary loan from Kean College of New Jersey.

Smit, D. (1996). A student's attitude towards skills, adjustment and performance, and the role of Supplemental Instruction. Unpublished Bachelor of Arts' Thesis, University of Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This thesis paper examines the use of Supplemental Instruction (SI) at the University of Port Elizabeth (South Africa). A qualitative research design was employed to study the outcomes of the SI program with students regarding attitudes toward skills, adjustment, and performance. The subject of the study was a first year chemistry student. The researcher noted that since SI is a student-driven activity, some academic skills are emphasized based on SI participant interest.

Stephens, J. E. (1995). A study of the effectiveness of Supplemental Instruction on developmental math students in higher education (Doctoral dissertation EdD, University of North Texas, 1995). Dissertation Abstracts International, 56(05), 1697A. (University Microfilms, No. 9529947).
This quasi-experimental doctoral dissertation research study examined the effects of participation in a Supplemental Instruction (SI) program on student test performance in a second-level developmental mathematics class in a four-year university setting (rural North Central Texas, 6300 FTE) during Spring 1994. The research design followed Campbell and Stanley's Nonequivalent Control group Model (1963) with repeated measures. This research deviated from past research on SI in that it examined effects of the SI program at the end of each of six test blocks rather than at the end of the course only. Test data were analyzed using analysis of variance; final course grades were analyzed using chi-square. Interview notes combined with notes on classroom behavior patterns and SI study session behaviors added to the ethnographic aspect of the study. Results showed that the SI students scored higher on unit tests throughout the semester, and this difference in scores became significant as the semester progressed (Score range: 0 to 100; Exam #1: 67.8 vs. 66.3; Exam #2: 78.97 vs. 74.34; Exam #3: 69.0 vs. 59.03; Exam #4: 84.13 vs. 54.02; Exam #5: 83.03 vs. 68.34; Final Exam: 68.77 vs. 51.35. Exams beginning with #3 were statistically significant ($p < .01$). The rate of A or B final course grades was higher for the SI group (36.6% vs. 6.7%). The rate of D and F grades (24.1% vs. 52.0%), course withdrawals (11.0% vs. 28.0%), and combined rate of D or F final course grades and withdrawals (35.4% vs. 80.0%) was lower for SI participants. Additional analysis examined the impact of low, medium and high attendance at SI sessions. These categories are defined as attending one-third, two-thirds, or all SI sessions during the examination period. Only in two of the six examination blocks was attendance found to be statistically significant (Exam #3 mean scores of SI participants: low, 62.7; medium, 75.33; high, 83.0. Exam #4: low, 78.33; medium, 88.42; high, 96.0). Overall percentage of SI participation grew throughout the academic term: exam #1, 18.7%; exam #2, 36.2%; exam #3, 46.7%; exam #4, 42.3%; and exam #5, 53.2%. Observations regarding behaviors during the SI sessions included: it took time before students became active and verbal participants; students began to

understand error patterns revealed during unit examinations; problem solving skills increased; increased ability to explain thinking process regarding problem-solving; discovery of multiple approaches to problem-solving; the group developed camaraderie; and the emergence of several SI participants as subgroup leaders. Observations regarding behaviors during class lectures by SI participants found that after several weeks they began to ask more questions to the instructor concerning lecture material.

Section Two: Books, Chapters, and Monographs

Ainsworth, L., Garnett, D., Phelps, D., Shannon, S., & Ripperger-Suhler, K. (1994). Steps in starting Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 23-30). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/jbstrt94.htm
An institution must complete a number of critical steps to effectively implement a new Supplemental Instruction (SI) program: present research-based information that suggests the effectiveness of SI; gaining administrative and faculty support; selecting a SI supervisor with sufficient release time; carefully supervising the SI program throughout the academic term; and using evaluation data for program improvement. The authors based their suggestions from past experience at Texas Tech University.

Arendale, D. (1993). Supplemental Instruction: Improving student performance and reducing attrition. In Educational Programs that Work: The Catalogue of the National Diffusion Network (19th ed., p. 14.4). Longmont, CO: Sopris West, Inc.
This overview of the Supplemental Instruction (SI) program provides a narrative description of SI, minimum requirements for successful implementation of the program, and services that the National Center for SI at the University of Missouri-Kansas City can provide to institutions that wish to implement SI.

Arendale, D. (1994). Understanding the Supplemental Instruction model. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 11-21). San Francisco, CA: Jossey-Bass Publishers. Available: http://www.umkc.edu/cad/si/sidocs/ jbover94.htm
This chapter provides a basic overview of the Supplemental Instruction model: common factors in student attrition; development of the SI program in 1973; key SI program personnel; administration and funding of SI programs; connection of the SI program with other campus programs.

Arendale, D. (1995). Self-assessment for adjunct instructional programs. In S. Clark-Thayer (Ed.), NADE Self-Evaluation Guides: Models for assessing learning assistance/developmental education programs (pp. 49-87). Clearwater, FL: H&H Publishing Company.
This chapter provides a framework for evaluating a campus Supplemental Instruction

(SI) program regarding a variety of issues: mission, goals, and objectives; program activities; program administration; human resources; facilities; value system; awareness of individual differences; and program evaluation. Adjunct instructional programs (AIPs) are defined as those forms of group collaborative learning assistance that accompany a specific targeted course to serve as a supplement for that course. These AIP activities occur outside of class.

Arendale, D. (1998). Increasing the efficiency and effectiveness of learning for first year college students through Supplemental Instruction. P. L. Dwinell, & J. L. Higbee (Eds.), The role of developmental education in preparing successful college students (pp. 185-197). Columbia, SC: The National Association for Developmental Education and the National Center for the Study of the Freshman Year Experience and Students in Transition. Available: http://www.umkc.edu/cad/ si/sidocs/daeffe98.htm
Supplemental Instruction (SI) can be a powerful force for increasing the efficiency and effectiveness of learning for students during the first year of college. With the paradigm shift from a focus on teaching to improvement of student learning, institutions are looking for a systematic approach to changing the campus learning culture. This chapter describes how SI addresses these needs and also provides a review of research in the U.S. and other countries regarding the impact of SI with improving student academic performance.

Ashwin, P. W. H. (1994). The Supplemental Instruction leader experience: Why SI is not teaching, a student's perspective. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 87-90). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/pasile94.htm
This chapter provides both a perspective as both a leader and supervisor in the Supplemental Instruction program at Kingston University and Newham College of Further Education in the United Kingdom. SI sessions is not about teaching for a number of reasons: new information is not given in addition to that provided by the professor; SI participants create the agenda for the SI sessions; no formal assessment is taken; equal focus is placed on the process of learning of material as well as the material itself; and students do not perceive themselves in the same type of power relationship with the SI leader as they feel with the course professor. SI leaders focus on involving all students at the sessions and having them process the course material.

Barlow, J., & Gardiner, P. (1994). Introducing Supplemental Instruction in engineering courses. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 17-24). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/jbengi94.htmThe authors describe the implementation of Supplemental Instruction in civil, mechanical, and electrical engineering courses at Brighton University in the United Kingdom. SI was introduced

in response to increasing pressures in higher education with reduced resources, much wider access, and changes in academic organizations. Evaluation reports suggest improvement by both the SI participants as well as the SI leaders.

Bidgood, P. (1994). The success of Supplemental Instruction: Statistical evidence. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 71-79). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/pbstat94.htm
Research studies from Kingston University (United Kingdom) suggest that Supplemental Instruction has been helpful in a wide range of courses. Several studies suggested that higher levels of SI attendance are correlated with higher final course grades: Computer Systems, 1990-91: 68.2 percentile vs. 61.3 percentile for non-SI and 1991-92: 61.9 vs. 61.0; Information Systems, 1990-91: 67.5 vs. 59.2 and 1991-92: 59.4 vs. 54.1; Software Engineering, 1990-91 52.9 vs. 50.4 and 1991-92: 48.6 vs. 42.9; Mathematics, 1990-91: 61.6 vs. 56.7 and 1991-92: 58.5 vs. 53.5; and Average Mark for All Courses, 1990-91: 62.7 vs. 56.9 and 1991-92: 57.0 vs. 52.8. Additional studies examined final course grades for comparable entry qualifications.

Bryngfors, L., & Bruzell-Nilsson, M. (1997). Supplemental Instruction: An experimental project with the method of Supplemental Instruction. Lund, Sweden: The Lund Institute of Technology and The Faculty of Science. Available: Lund University, Center for Supplemental Instruction, Kansli LTH, Box 118, 221 00 Lund, Sweden.
This report provides an overview of the expansion of the Supplemental Instruction (SI) program into Sweden. Research studies in 1996 from Lund University (Lund, Sweden) suggest that SI participation contributes to higher percent of students passing the final examination for the course (46 percent vs. 39 percent), and a higher rate of reenrollment (15 percentage points higher). The mean average of students participating in SI was 46 percent. Interviews with SI participants, SI leaders and the course professors who had SI attached to their class reported positive comments concerning the impact of the SI program. SI leader comments could be placed into three categories: contact with and the opportunity to assist in the learning process of the new students; deeper knowledge of the subject; and deeper knowledge of the learning process and leadership experiences. Faculty members mentioned the following reasons for supporting the SI program: received feedback from students concerning problems that students encountered but did not disclose to the course instructor; SI sessions provided another forum for students to engage in deeper understanding and problem solving; students appeared more ready to participate in class oral examinations due to practice of similar activities in SI sessions; students were more skilled in participating in collaborative learning activities required by the course professor; and students appeared to have higher morale since they established working relationships with other students who could support their academic work. The authors for this report also serve as the Certified Trainers for SI in Sweden and surrounding countries.

Bryngfors, L., & Bruzell-Nilsson, M. (1997). Supplemental Instruction: An experimental project with the method of Supplemental Instruction. In R. B. Ludeman, & S. Hubler (Eds.), Quality student services around the world: Bridging student needs and student success (pp. 221-246). Washington, D.C.: National Association of Student Personnel Administrators.
This report provides an overview of the expansion of the Supplemental Instruction (SI) program into Sweden. Research studies in 1996 from Lund University (Lund, Sweden) suggest that SI participation contributes to higher percent of students passing the final examination for the course (46 percent vs. 39 percent), and a higher rate of reenrollment (15 percentage points higher). The mean average of students participating in SI was 46 percent. Interviews with SI participants, SI leaders and the course professors who had SI attached to their class reported positive comments concerning the impact of the SI program. SI leader comments could be placed into three categories: contact with and the opportunity to assist in the learning process of the new students; deeper knowledge of the subject; and deeper knowledge of the learning process and leadership experiences. Faculty members mentioned the following reasons for supporting the SI program: received feedback from students concerning problems that students encountered but did not disclose to the course instructor; SI sessions provided another forum for students to engage in deeper understanding and problem solving; students appeared more ready to participate in class oral examinations due to practice of similar activities in SI sessions; students were more skilled in participating in collaborative learning activities required by the course professor; and students appeared to have higher morale since they established working relationships with other students who could support their academic work. The authors for this report also serve as the Certified Trainers for SI in Sweden and surrounding countries.

Burmeister, S. L. (1994). The challenge of Supplemental Instruction: Improving student grades and retention in high risk courses. In M. Maxwell (Ed.), From access to success: A book of readings on college developmental education and learning assistance programs (pp. 209-214). Clearwater, FL: H&H Publishing Company.
This chapter provides a general overview of the Supplemental Instruction (SI) program, its history and components. Review of significant research studies of the SI model is included (e.g., course grade and reenrollment by entry-test score, graduation rates). A new study suggests that SI attendance was correlated with higher final course grades in three types of mathematics courses: College Algebra (2.21 vs. 1.98), Calculus (2.28 vs. 1.83), and Statistics (2.49 vs. 2.32). The study included data from 45 institutions with a total of 11,252 students enrolled in 177 classes. SI participants earned mean final course grades that were higher than non-participants in all three categories of mathematics courses. Suggestions are provided for improving the effectiveness of campus SI programs.

Burmeister, S. L., Carter, J. M., Hockenberger, L. R., Kenney, P. A., McLaren, A., & Nice, D. L. (1994). Supplemental Instruction sessions in College Algebra and Calculus. In D.

C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 53-62). San Francisco, CA: Jossey-Bass, Inc.
Based on their observations of math Supplemental Instruction sessions, the authors review several active learning strategies that have been effective for students of the discipline. Critical activities for SI participants include: active involvement by all SI session participants; test their approaches to problems; precise use of math vocabulary; attention to precision; practice solving problems under time constraints; vocalize their thinking process regarding problem solving to each other; and set part of the agenda of SI sessions. SI leaders need strong support from the SI supervisor for such activities to characterize SI sessions.

Burmeister, S. L., Kenney, P. A., & Nice, D. L. (1996). Analysis of effectiveness of Supplemental Instruction sessions for college algebra, calculus, and statistics. In J. J. Kaput, A. H. Schoenfeld, & E. Dubinsky (Eds.), Research in Collegiate Mathematics Education II (pp. 145-154). Providence, RI: American Mathematical Association and Mathematical Association of America.
After an overview of the Supplemental Instruction (SI) model, this article focuses on a research study concerning the effectiveness of SI for 11,252 students enrolled in 177 courses in college algebra, calculus and statistics from 45 different institutions. In comparison with non-SI participants, SI participants earned higher mean final course grades and experienced lower rates of withdrawals: algebra (2.21 vs. 1.98); calculus (2.28 vs. 1.83); and statistics (2.49 vs. 2.32).

Davies, J., & Johnston, S. (1994). The institutional implementation of Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 55-63). Birmingham, England: Staff and Educational Development Association. Available:
http://www.umkc.edu/cad/si/sidocs/jdinst94.htmThis chapter describes the implementation of Supplemental Instruction at the University of Plymouth in the United Kingdom. Proponents of the SI program were careful to generate wide support rather than having the program implemented solely by the top institutional leaders. The "SI Working Group" was formed to carefully explore key questions before a final decision was made regarding SI implementation. Liaison relationships were established with the faculty staff, students, and the Dean. While there were challenges during the pilot implementation of SI, the program continues to develop.

Donelan, M. (1994). Introducing Supplemental Instruction in mathematics, law, architecture, geography, and statistics. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 41-50). Birmingham, England: Staff and Educational Development Association. Available:
http://www.umkc.edu/cad/si/sidocs/mdintr94.htm
This chapter describes the introduction of Supplemental Instruction (SI) at University College London (UCL) in the United Kingdom. Goals for the SI program was to

improve both students' personal skills alongside their academic abilities. With would provide a vehicle for improving their personal transferable, as well as cognitive, skills while gaining an experiential understanding of groupwork. SI leaders are generally not paid as SI mirrors a variety of other unpaid student facilitation programs elsewhere at UCL. SI was implemented in mathematics, law, architecture, geography, and statistics. Positive improvements were reported for both SI participants and the SI leaders.

Gardiner, P., Corbett, B., & Palmer, P. (1994). Increasing student participation in the education of civil engineers. In J. Wallace (Ed.), Kingston University HEFCE Supplemental Instruction Project: 1993-94 (pp. 237-241). London, England: Kingston University. Available: http://www.umkc.edu/cad/si/sidocs/pgengi94.htm
Through use of Supplemental Instruction in the civil engineering courses at the University of Brighton (East Sussex, United Kingdom), improvement occurred in: student learning, self-motivation, and team work skills.

Gravina, M., & Adams, B. (1991). Supplemental Instruction: Integration of approaches to help high-risk students. In Youth at-risk: A resource guide (pp. 67-74). Lancaster, PA: Technonic Publishing Company, Inc.
The book chapter describes the use of Supplemental Instruction (SI) to assist students who have been predicted to be of academic risk at the institution.

Hall, P. T. (1993). Use of Supplemental Instruction at the University of Missouri-Kansas City School of Law. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 38-39). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/ dalaw193.htm
The author describes the use of Supplemental Instruction with first-year "special-admit" law students at the University of Missouri-Kansas City. SI sessions were offered in Introduction to Law, Contracts I, Property I, and Criminal Law. While special admit students were directed to participate in the SI sessions, the program was open to all students enrolled in the four courses. Research suggests that the SI program assisted students to earn higher grades. Reenrollment rates for the special admit students was higher than before the introduction of the SI program.

Hamilton, S., Blakeley, R., Critchley, C., Playford, J., Kelly, B. A., McNamara, E., & Robertson, R. (1994). Supplemental Instruction at the University of Queensland: A pilot program. Brisbane, Queensland, Australia: University of Queensland.
The project at the University of Queensland (Australia) investigated the effectiveness of incorporating Supplemental Instruction (SI) with two large first-level biological science subjects (Introductory Biochemistry and Plant Biology). Research studies suggest that the SI program contributed to higher final course grades for SI participants (63.2 percentile vs. 52.7 percentile). The following factors were cited as important for program success: financial commitment by the academic department; availability of an

experienced SI coordinator; selection and training of appropriate SI leaders; and full support of the program and the leaders by academic staff associated with the subject.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. In J. Wallace (Eds.), Kingston University HEFCE Supplemental Instruction Project: 1993-94 (pp. 231-236). London, England: Kingston University. Available: http://www.umkc.edu/cad/si/ sidocs/chengi94.htm
The study investigates the effectiveness of Supplemental Instruction at the Glasgow Caledonian University. Preliminary results indicate: a) improved performance in the students' annual examinations (e.g., Electrical Engineering Principles: 61 percentile vs. 46 percentile for non-SI participants); b) reduction in students' drop-out rates; c) enhanced communication and other transferable skills and d) deeper understanding of engineering principles.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. In H. C. Foot, C. J. Howe, A. Anderson, A. K. Tolmie, & D. A. Warden (Eds.), Group and interactive learning . Southampton, England: Computational Mechanics Publications.
The author reported improved performance in annual examination results of Supplemental Instruction (SI) students as well as reductions in dropout rates, coupled with enhanced communication and other transferable skills and a deeper understanding of the principles of engineering at the British higher education institution.

Healy, C. E. (1994). Introducing Supplemental Instruction in engineering. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 25-30). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/ehengi94.htm
This article describes the implementation of Supplemental Instruction in engineering courses at Glasgow Caledonia University in Scotland. The University is seeking to initiate cultural change through partnership events involving students, staff and employees. Research studies suggested improvements by both the SI participants (64.8 percentile vs. 54.4 percentile for non-SI participants) and the SI leaders. Some SI leaders reported that they had now considered pursuing a teaching career based on the positive experience with the SI program.

Hill, S., Gay, B., & Topping, K. J. (1998). Peer-assisted learning beyond school. In K. Topping, & S. Ehly (Eds.), Peer-assisted learning (pp. 291-311). London: Lawrence Erlbaum Associates, Publishers.
This book chapter provides a wide overview of peer-assisted learning (PAL) programs. The first part deals with cross-age tutoring programs. This most often involve college students working with young people. It is common for student tutors to report growth in improved communication skills, self-confidence, cognitive gains. The studies have had mixed results concerning cognitive gains by the tutees. More common improvements are reported with the social and affective domains. The authors report substantial and persuasive evidence of impact on dropout rates, course grades, and graduation outcomes.

Ilsley, G. (1994). Introducing college-wide Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 65-70). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/ si/sidocs/giintr94.htm
Supplemental Instruction is being used at Nene College (Northampton, United Kingdom). SI was used in five courses drawn from engineering, building studies, human biological studies and information systems. Research studies suggest improvement with SI participants.

Kaye, P. (1994). Introducing Supplemental Instruction in law. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 51-54). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/ si/sidocs/pklaw94.htm
Supplemental Instruction was introduced at the University of Central Lancashire (United Kingdom) in the law program. While the targeted courses did not have high rates of low grades or withdrawal, there were several other reasons for their selection: enhancement of students' competencies and skills; leadership development; appreciation for learning outside of the formal classroom environment; and increased understanding of substantive legal issues.

Kenney, P. A., & Kallison, J. M. (1994). Research studies of the effectiveness of Supplemental Instruction in mathematics. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 75-82). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/jbmth194.htm
Given the emphasis on the need to succeed in college-level mathematics courses, these authors take a careful look at the effects of Supplemental Instruction participation on student performance. In addition to reviewing other research studies, this chapter focuses on the use of SI in Fall 1989 at the University of Texas at Austin in Calculus for Business Students and Calculus for Engineering and Natural Science Students. This paper describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then chosen as a

more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership. Additional studies were conducted concerning SI. The first study compared the performance of students in Business Calculus. While SI was beneficial to all SI participants (2.39 vs. 1.96 for non-SI participants), it was especially helpful for lower-ability students. The second study focused on an Engineering Calculus course. While the difference was closer for the two groups (2.01 vs. 1.91 for non-SI participants), SI provided disproportionate help to the lower-ability students as measured by SAT quantitative scores.

King, P. (1994). Supervision of Supplemental Instruction leaders: A practical guide. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 81-84). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/pksupe94.htm
This chapter describes the Supplemental Instruction supervision system at Kingston University in the United Kingdom. Common issues mentioned by SI leaders included: SI session difficulties; SI session leadership skills; strategies to build SI attendance; and SI leader morale.

King, P. (1994). Supplemental Instruction as a staff development model. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 37-39). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/ptdeve94.htm
This article describes the partnership between the faculty development unit at Kingston University (United Kingdom) and a member of the instructional faculty (professional full-time tutor who also delivered lectures to the students) as they used Supplemental Instruction for student enrichment and staff development. Several courses were targeted in the School of Surveying: Quantity Surveying and Urban Estate Management and European Estate Management studies. The tutor adopted several SI session activities to use during times that were traditionally conducted in a tutorial format. Behavioral changes in students included: students took initiative in sessions for selecting and discussing topics; students worked with each other to identify additional information; students asked more challenging questions of the tutor in class; and students looked to each other for support when challenged with academic matters.

Koch, E. (1997). Lecturing between hope and despair: Lecturers' perceptions of academic development needs of students and lecturers at the University of Port Elizabeth. Port Elizabeth, Republic of South Africa: University of Port Elizabeth, Centre for Academic and Organizational Development.
This report assessed the perceptions of lecturers of the success of academic development at the University of Port Elizabeth in the Republic of South Africa. The problem which emerged from the discussions was the growing number of underprepared and unprepared students who desire to attend tertiary education. Supplemental Instruction (SI) is regarded as a good program, but lecturers do not think that it reaches the targeted group of student effectively and deals adequately with the underlying problems. Since SI is voluntary, not all students who should come do so. Additionally, lecturers believe an increase in the structure of SI sessions may raise academic performance of the underprepared students who they believe need this. Additional solutions offered by the lecturers include: extended curriculum to provide more time-on-task; alternative learning methods by inclusion inside the class the use of collaborative learning, computerized self-paced instruction, and other methods.

Lockie, N. M., & Van Lanen, R. J. (1994). Supplemental Instruction for college chemistry courses. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 63-74). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/ cad/si/sidocs/jbchem94.htm
Strategies for maximizing the effectiveness of Supplemental Instruction in college chemistry courses are presented. The authors share lessons from use of SI in Principles of Inorganic Chemistry, Principles of Organic Chemistry and Biochemistry, General Chemistry 1, and Organic Chemistry I and II at Saint Xavier University (Chicago, IL). Some of the SI session strategies include: problem-solving strategies; review of basic chemistry content; accurate use of chemical language; collaborative learning activities that promote active learning by all SI session participants; quizzes to provide comprehension checkpoints; and sharing study strategies with each other.

Marcus, D. (1996). Supplemental Instruction with mentoring support at Anne Arundel Community College. In R. Shoenberg (Ed.), Lessons learned from Fund for the Improvement of Postsecondary Education Projects III . Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education. Available: http://www.ed.gov/offices/ OPE/FIPSE/LessonsIII/anne.html
This chapter describes the use of Supplemental Instruction (SI) at Anne Arundel Community College (Arnold, MD) for faculty development purposes in addition to increasing academic achievement of participating students. SI leaders were paired with faculty mentors who participated in the initial training workshop for SI leaders. For the first four weeks of the term the faculty mentor participated as learners by attending class lectures and SI sessions whose student SI leaders they supervise and by keeping a journal of their experiences. Mentors were placed in courses outside their discipline so that they would focus on the learning process rather than being tempted to critique the

instructional content of the course professor. Mentors reported that they increased their own teaching skills and their view of the learning process.

Marshall, S. (1994). Faculty development through Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 31-40). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/jbfacd94.htm
Involvement of faculty members with the Supplemental Instruction program can lead to personal and professional renewal for the faculty participants. The author describes the impact of SI with faculty members at Salem State College. Faculty members received an indirect faculty development experience through the following activities: attending training workshops initially designed for the SI leaders; frequent meetings with the SI leader assigned to their class; and participating in monthly seminars that involved SI leaders in discussing learning and teaching skills (group facilitation skills, critiques of teaching presentations, motivation activities, dealing racism and sexism, reviewing SI data studies). Faculty members who participated in this faculty development project reported numerous positive changes in their attitudes and classroom behaviors.

Martin, D. C. (1980). Learning centers in professional schools. In K. V. Lauridsen (Ed.), Examining the scope of learning centers (pp. 69-79). San Francisco, CA: Jossey-Bass, Inc.
This chapter describes the role of academic assistance for students in professional schools. The use of Supplemental Instruction (SI) for medical students is described. Several research studies suggest that SI contributes to higher academic achievement and the rate of D, F and course withdrawals have been reduced by 20 percent. Fifty to seventy percent of the medical students enrolled in a given course participate in the service. Data suggests that there is a transfer effect of SI, students who take advantage of SI maintain their GPA lead over nonparticipating students during the following academic term in the second course in the same sequence.

Martin, D. C., & Arendale, D. (1993). Foundation and theoretical framework for Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 41-50). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/ datheo93.htm
This chapter provides an overview of SI's educational pedagogy. Piaget and Vygotsky's writings on constructivism serve as a major basis for describing how students "construct" their own knowledge. This requirement for students to actively create their own knowledge drives many SI session strategies. Tinto's theories on student departure based on students' need for academic and social integration also guide the implementation of the SI program. Additional theorists include Keimig (Hierarchy of Learning Improvement Programs), Weinstein (metacognition), and a variety of researchers concerning collaborative learning.

Martin, D. C., & Arendale, D. (1993). Review of research on Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 19-26). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839)
This chapter compares a national research study concerning the effectiveness of Supplemental Instruction with studies from the University of Missouri-Kansas City. The National Center for SI collects SI data from a diverse sample of higher education institutions from across the U.S. The national study included data from 49 institutions that had offered SI in 1,477 courses of diverse curriculum areas. The findings suggest that SI participants in comparison with non-SI participants earn higher final course grades (2.46 vs. 2.12), earn a higher percent of A and B final course grades, and receive a lower percent of D, F and withdrawal final course grades (23% vs. 38%). Data collected from 1980 to 1992 in 217 courses with an enrollment of 9,365 students at UMKC confirms the national studies. Additional studies conducted at UMKC suggested higher academic achievement for SI participants with reenrollment (90.0% vs. 81.5%) and graduation rates (30.6% vs. 18.2%). Several studies from UMKC studied the potential impact of student motivation levels, ethnicity, and previous levels of academic preparation. These were not found to have a statistically significant impact upon the research studies.

Martin, D. C., & Arendale, D. (Eds.) (1993). Supplemental Instruction: Improving first-year student success in high-risk courses (2nd ed.). Columbia, SC: The University of South Carolina and the National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839)
This monograph describes Supplemental Instruction (SI), a study assistance program designed to improve the academic success of college freshmen based on the idea that if students are not being successful in courses then perhaps they will withdraw from the institution. The first chapter reviews the SI model. Chapter two explains in detail how SI works in the freshman year. Chapter three offers a review of the research on SI. Chapter 4 examines why educators and students choose SI. Chapter five shows how SI has been adapted to an urban high school, to English composition classes, and to a law school at the University of Missouri-Kansas City. The last chapter reviews the foundation and theoretical framework of SI. An appendix lists institutions currently using SI. (Contains 60 references.) Available from ERIC Document Reproduction Service, No. ED 354 839.

Martin, D. C., & Arendale, D. (1993). Supplemental Instruction in the first college year. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 11-18). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/da
This chapter describes how the Supplemental Instruction program can help meet some of

the unique needs presented to students during their first year of college: integrating learning/study strategies within regular content courses; and supporting students enrolled in historically-difficult first-year courses; assisting student subpopulations make a successful transition into college (academically talented, remedial/developmental, field-dependent). Like other successful programs for students in the first-year, central objectives of the SI program are to: develop a felt sense of community; involvement of students in the life of the institution; and providing an environment to support academic and social integration.

Martin, D. C., & Arendale, D. (1993). Understanding the Supplemental Instruction model. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 3-10). Columbia, SC: The National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/daove193.htm
Theoretical and philosophical underpinnings for the Supplemental Instruction model is included in this overview. Some of the major issues are reviewed: common factors in student attrition; focus on "high-risk courses" rather than "high-risk students;" proactive assistance before problems occur; key SI features; essential partners for SI success; creating awareness and generating support for SI on campus; and movement from a reactive to a proactive mode of student academic assistance.

Martin, D. C., & Arendale, D. (Eds.). (1994). Supplemental Instruction: Increasing achievement and retention (New Directions for Teaching and Learning No. 60). San Francisco, CA: Jossey-Bass.
This monograph features nine chapters concerning: overview and foundation of the Supplemental Instruction (SI) program; use of SI for faculty development; SI in the content areas (humanities, mathematics, chemistry); research studies concerning SI; and the newest innovation of SI called Video-based Supplemental Instruction (VSI).

Martin, D. C., & Arendale, D. (1998). Supplemental Instruction and Video-based Supplemental Instruction. In American Association for Higher Education, American College Personnel Association, and National Association of Student Personnel Administrators (Eds.), Powerful partnerships: A shared responsibility for learning (pp. 6-7). Washington, D.C.: Editors.
This report describes the different ways that institutions build campus partnerships to deepen student learning both inside and outside the classroom. AAHE, ACPA, and NASPA formed a Joint Taskforce on Student Learning to identify successful models that have implications for pedagogy, curricula, learning environments, and assessment. Both the Supplemental Instruction and Video-based SI programs were highlighted as being a model for the first principle of learning and collaborative action: Learning is fundamentally about making and maintaining connections: biologically through neural networks; mentally among concepts, ideas, and meanings; and experientially through

interaction between the mind and the environment, self and other, generality and context, deliberation and action.

Martin, D. C., Arendale, D., & Blanc, R. A. (in press). Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction. In H. Levin (Ed.), Alternatives to developmental education . San Francisco, CA: Jossey-Bass Publishers. Available: http://www.umkc.edu/cad/si/sidocs/sivsi97.htm
This book chapter was originally delivered as a paper at a special conference in January 1998 on "Alternatives to Developmental Education" that was sponsored by the U.S. Department of Education funded National Center for Lifelong Learning based at Stanford University (CA). The conference was convened to deal with the growing concern by some states regarding traditional developmental education credit courses. The conference was designed to identify several alternative ways of accomplishing the same purposes as developmental courses (e.g., linked courses, critical thinking courses, SI, VSI). This chapter first provides an overview of SI and VSI. Then it concludes with the pedagogical basis for both. In developmental education, research scholars embrace the reductionist approach by seeking first to identify the separate and distinct skills required for academic success, then to measure the degree to which these are present or absent in the individual, and finally to isolate and teach those skills that are in deficit. Practitioners assume that mastery of a series of independent skills lead to academic competency. SI and VSI break with this view and provide a holistic approach to education. Given sufficient efficiency on task, effective guidance, and the time and opportunity to do so, any serious student can learn.

Martin, D. C., Arendale, D., & Widmar, G. E. (1998). Creating communities for learning. In L. Hardge (Ed.), Bridges to student success: Exemplary programs 1998 (pp. 27-33). Washington, D.C.: National Association for Student Personnel Administrators.
This monograph chapter provides a basic overview of the Supplemental Instruction (SI) model. In addition to the basic overview, the authors describe how SI provides a pluralistic environment where students can learn to value the unique perceptions of others who may view the world differently than themselves. SI provides a structured environment for students to participate in learning communities outside the supervision of the class professor.

Martin, D. C., & Blanc, R. A. (1994). Supplemental Instruction: An organic model in transition, the views of SI's initiator. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 91-94). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/dmorga94.htm
This chapter describes the history and development of Supplemental Instruction in the United States by the program's creator. The essential elements of successful SI programs are described. In addition, the chapter reviews the adaption of the SI model

for the British higher education system through the work of Jenni Wallace of Kingston University, London.

Martin, D. C., & Blanc, R. A. (1994). Video-Based Supplemental Instruction: A pathway to mastery and persistence. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 83-92). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/jbvsi94.htm
The Video-Based Supplemental Instruction (VSI) delivery system using Supplemental Instruction that is described here combines developmental studies with core curriculum courses, offering an alternative to remedial/developmental instruction. Students that are least prepared at the institution need a more powerful academic support service. The difference between the VSI approach and those traditionally used in postsecondary education lies in the centrality of students to the process as opposed to the centrality of the material to be learned: students conduct the preview; students determine the pace of the lecture; students assure their own mastery as the lecture progresses; students select the key points for immediate review; and students identify misconceptions and modify and adapt their conceptions to achieve, eventually, more complete understanding. VSI was designed to allow such students to both earn credit for core curriculum courses while they develop the requisite learning strategies needed for academic success. This provides an alternative way to provide developmental education.

Martin, D. C., Blanc, R. A., & Arendale, D. (1996). Supplemental Instruction: Supporting the classroom experience. In J. N. Hankin (Ed.), The Community College: Opportunity and Access for America's First-Year Students (pp. 123-133). Columbia, SC: University of South Carolina: The National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 393 486). Available: http://www.umkc.edu/ cad/si/sidocs/dasupp96.htm
This chapter reviews the impact of the Supplemental Instruction program with fifty-nine two-year colleges across the U.S. The research study contained reports from 480 classes that enrolled 23,979 students. The data suggests that SI participation was correlated with higher academic achievement: higher mean final course grades (2.30 vs. 1.63); higher percentage of A or B final course grades (50.6% vs. 32.9%); and lower rates of D, F and withdrawals (25.9% vs. 46.3%). Similar findings occurred when the data was separated by broad academic disciplines: business, health science, mathematics, natural science, social science/humanities, and technical/vocational. In addition, the themes of attrition identified by Tinto (adjustment, isolation, difficulty, and incongruence) are used as a paradigm to examine the possible reasons for the positive impact of the SI program. Several SI programs reported the use of SI for faculty development: faculty serve as SI supervisors and adopt SI sessions strategies into their own lectures; faculty SI supervisors provide requested feedback to the course professors that they observe concerning class presentation activities; and faculty who observe SI sessions report using more student-led collaborative learning activities during their class sessions.

Martin, D. C., Blanc, R. A., & DeBuhr, L. (1982). Supplemental Instruction: A model for increasing student performance and persistence. In L. Noel, & R. Levitz (Eds.), How to succeed with academically underprepared students: A catalog of successful practices (pp. 75-79). Iowa City, IA: ACT National Center for the Advancement of Educational Practices.
This article provides a basic overview of the Supplemental Instruction (SI) program. Included is a research study of 746 students enrolled in seven Arts and Sciences courses in Spring semester 1980. SI participants earned higher mean final course grades (2.70 vs. 2.25) and received lower rates of D, F and withdrawal grades (18.4% vs. 44.0%).

Martin, D. C., Blanc, R. A., & DeBuhr, L. (1983). Retention with integrity through Supplemental Instruction. Kansas City, MO: The University of Missouri-Kansas City, Student Learning Center. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This monograph provides a comprehensive overview of the Supplemental Instruction (SI) program. It can serve as a training manual for SI supervisors and SI leaders to implement the program on a college campus. Topics include: overview of SI; establishing and conducting SI sessions; guidelines for SI leaders; SI program evaluation procedures; writing lab adaptations of SI; adapting SI to English composition classes; SI on a small campus; student denial; and diagnosing learning problems of gifted adults.

Martin, D. C., Blanc, R. A., DeBuhr, L., Alderman, H., Garland, M., & Lewis, C. (1983). Supplemental Instruction: A model for student academic support. Kansas City, MO: The University of Missouri-Kansas City and ACT National Center for the Advancement of Educational Practices. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This monograph provides a basic overview of the Supplemental Instruction (SI) model: basic overview; UMKC student academic performance in seven Arts and Sciences courses during 1980 reported earlier in the 1983 article by Blanc, DeBuhr and Martin (final course grades, impact of student motivation, reenrollment rates, performance of students separated by upper and lower quartile scores, and changes in D, F and withdrawal rates for the courses) and new studies examining students of color and medical school students; generating campus awareness and support; case studies of SI's use outside of UMKC (Maple Woods Community College - MO, Bethel College - KS, Kansas State University - KS); training SI leaders; and evaluation procedures for program review.

Martin, D. C., Hall, P. T., & Arendale, D. (1993). Use of Supplemental Instruction at an urban high school. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 31-33). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/ dadmhs93.htm

The authors describe the use of Supplemental Instruction -- traditionally a post-secondary academic program -- with an urban high school in Kansas City, Missouri. Westport High School is a culturally-diverse school located in the central city. Over half the students were one or two years behind grade levels in reading and mathematics and an equal number were economically disadvantaged. SI was provided to students enrolled in 9th and 10th grade English and history classes. SI sessions were scheduled during a scheduled time during the school day three times each week. Research studies suggested that there was improvement in final course grades of students in the English (A and B grades: 28.7% vs. 13.6% before SI; F grades: 23.2% vs. 32.7% before SI) and history classes. Interviews with students and teachers suggest that participation in the SI program also promoted higher levels of class participation and higher achievement on standardized test scores.

Martin, D. C., Lorton, M., Blanc, R. A., & Evans, C. (1977). The learning center: A comprehensive model for colleges and universities. Grand Rapids, MI: Aquinas College. (ERIC Document Reproduction Service No. ED 162 294)
Intended for use by educators responsible for developing post-secondary learning centers, this manual emphasizes the design and administration of such centers rather than the various aspects of skill instruction. Its seven chapters discuss the concept of a learning center; the components of the model, including Supplemental Instruction, recruitment and selection of staff, the training of tutorial and teacher assistants, learning materials, distinct labs, noncredit readiness in content areas, and extension of the model; diagnosis of institutional and individual needs; instructional methodology, specifically listening, notetaking, study skills, vocabulary, and comprehension; affective consideration, with a discussion of a "relaxation" project; evaluation, including sample data and forms; and proposal preparation.

Martin, D. C., & Wilcox, F. K. (1996). Supplemental Instruction: Helping students to help each other. In G. Wisker, & S. Brown (Eds.), Enabling student learning: Systems and strategies (pp. 97-101). Birmingham, England: Kogan Page Publishers and the Staff and Educational Developmental Association (SEDA). (ERIC Document Reproduction Service No. ED 396 611) Available: http://www.umkc.edu/cad/si/sidocs/dmhelp96.htm
This chapter reviews the development of the Supplemental Instruction (SI) model in the United States and its recent introduction into the United Kingdom. Several additions were made to the SI model with its use in the United Kingdom. Due to scheduling conflicts for SI leaders, it is necessary to provide several SI leaders in each course. An advantage of this decision is that the SI program provides more professional development opportunities for the SI leaders. Another feature of the SI program in the UK is the common practice of the SI leader providing feedback to the course professor and the course tutor concerning student comprehension of the lecture material. The authors emphasize the need for academic support and learning enrichment for all students in higher education.

Maxwell, M. (1979). Overcoming problems of learning services. In M. Maxwell (Ed.), Improving student learning skills (pp. 158-160). San Francisco, CA: Jossey-Bass Publishers, Inc.
The author provides an overview of the Supplemental Instruction (SI) program. Deanna Martin, creator of the SI model, is quoted regarding the relationship between the faculty member and the SI program. The SI leader can serve as a feedback mechanism for the course professor regarding the comprehension level of the students if invited to do so. This provides an opportunity for the course professor to review or clarify lecture content at the next class meeting. Martin urges caution not to use the SI program as a tool by administrators to change teacher behavior or the bond of cooperation between the SI program and the professor may be placed at risk.

Maxwell, M. (1997). Successful programs and strategies for teaching high-risk college students. In M. Maxwell (Ed.), Improving student learning skills (2nd ed., pp. 158-178). Clearwater, FL: H&H Publishing Company, Inc.
This chapter provides an overview of the Supplemental Instruction (SI) program and Video-based Supplemental Instruction (VSI) program on pages 169 to 172. A case study of SI at California State University at Long Beach indicated that the program was modified due to financial funding problems to turn SI into an adjunct course bearing one unit of nonbaccalaureate credit toward financial aid and other full-time enrollment obligations. Academically disadvantaged students (e.g., TRIO or Equal Opportunity Program students) attend SI at higher rates due to this higher level of commitment. Grades are based on a credit/no credit basis. Comparing performance of students with their own peer group reveals that underprepared students usually benefit more from SI that traditional students.

McCormick, J. (1983). Writing lab adaptions of Supplemental Instruction. In D. C. Martin (Ed.), Supplemental Instruction: A model for student academic support (pp. 87-93). Kansas City, MO: The University of Missouri-Kansas City and the ACT National Center for the Advancement of Educational Practices. Available: http://www.umkc.edu/cad/si/sidocs/jmwrit93.htm
The author describes how the Supplemental Instruction (SI) was customized for use within the University of Missouri-Kansas City's writing laboratory. Since students in the group are enrolled in the same content course (e.g., American history), all have a common experience and see direct application of their writing skills since the discussions are not in isolation from the content course for which the writing assignment is due. This increases student motivation and aids in the transfer effect to other content courses. Peer review and mutual responsibility for critiquing each other's work encourages collaboration.

McGraw, S. P., & Newkirk, S. L. (1995). Adaptation of Supplemental Instruction with mentoring support at Anne Arundel Community College. In S. P. McGraw, & S. L. Newkirk (Eds.), Fund for the Improvement of Postsecondary Education Program Book .

Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education. Available: http://www.ed.gov/offices/OPE/FIPSE/95ProgBk/annarun.html
This chapter describes how Rosemary Wolfe, FIPSE Project Director for Supplemental Instruction (SI) with Mentoring Support, will be working with Ashland Community College in Kentucky to adapt the SI program for underprepared students enrolled in required general education courses; Daytona Community College to adapt the program to math courses and the peer review process; Dutchess Community College to adapt the program to lab courses; and Community College of Philadelphia to adapt the program to student success in difficult courses. Expected outcomes for faculty include increased interactive teaching skills and the development of new teaching approaches, an awareness of their teaching styles and an understanding of students' needs.

McGraw, S. P., & Newkirk, S. L. (1996). Disseminating proven reforms: Supplemental Instruction with mentoring support at Anne Arundel Community College. In S. P. McGraw, & S. L. Newkirk (Eds.), Fund for the Improvement of Postsecondary Education Program Book . Washington, D.C.: Fund for the Improvement of Postsecondary Education, U.S. Department of Education.
This chapter describes how Rosemary Wolfe, FIPSE Project Director for Supplemental Instruction (SI) with Mentoring Support, worked Ashland Community College in Kentucky, Daytona Community College, Dutchess Community College, and the Community College of Philadelphia. Expected outcomes for faculty include increased interactive teaching skills and the development of new teaching approaches, an awareness of their teaching styles and an understanding of students' needs.

McMillin, J. (1983). Adapting Supplemental Instruction to English composition classes. In D. C. Martin (Ed.), Supplemental Instruction: A model for student academic support (pp. 95-100). Kansas City, MO: The University of Missouri-Kansas City and The ACT National Center for the Advancement of Educational Practices. Available: http://www.umkc.edu/cad/si/sidocs/ jmeng193.htm
This chapter describes the customization of the Supplemental Instruction model for use in English composition classes at Point Loma College (CA). The author emphasized the following elements of SI with use in the composition classes: discovery of learning in a non-threatening environment; a focus on developing a "co-worker" relationship between the SI leader and students; an awareness of process as well as content in teaching and learning; importance of reasoning skills in developing writing competency; and the role of the student as a responsible agent in his/her own educational process. This chapter provides a simulated conversation of an editing session between the SI leader and the student to illustrate the above elements.

McMillin, J. (1993). Adapting Supplemental Instruction to English composition classes. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 34-37). Columbia, SC: National

Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 354 839) Available: http://www.umkc.edu/cad/si/sidocs/jmeng193.htm
This chapter, initially published in 1983, describes the customization of the Supplemental Instruction model for use in English composition classes. The author emphasized the following elements of SI with use in the composition classes: discovery of learning in a non-threatening environment; a focus on developing a "co-worker" relationship between the SI leader and students; an awareness of process as well as content in teaching and learning; importance of reasoning skills in developing writing competency; and the role of the student as a responsible agent in his/her own educational process. This chapter provides a simulated conversation of an editing session between the SI leader and the student to illustrate the above elements.

Muraskin, L. (1997). "Best practices" in Student Support Services: A study of five exemplary sites. Washington, D.C.: U.S. Department of Education. Available: ERIC Document Reproduction Service, ED 416 784
This report examines "best practices" in the delivery of Student Support Services (SSS), one of the Special Programs for Disadvantaged Students collectively known as the TRIO programs. The study is based on case studies that were conducted in five local SSS projects during early 1996. The five projects were drawn from 30 projects in the National Study of Student Support Services, a longitudinal survey of students begun in 1991. A common theme of academic support at all five institutions was with providing learning assistance for developmental and popular freshman courses. Two of the five sites used Supplemental Instruction (SI) as an integral part of academic enrichment for SSS students. Another site used a variation of SI.

Ochae, R. (1995). Writers at risk: An experiment with Supplemental Instruction in freshman writing classrooms. Black Hills State University Research and Scholarly Work Symposium Research and scholarly work symposium proceedings (pp. 67-72). Spearfish, SD: Black Hills State University.
This book chapter describes the use of Supplemental Instruction (SI) during Fall 1994 at Black Hills State University (Spearfish, SD) with a beginning writing class (English 101). The institution has an open admission policy and high attrition and dropout rates in the first writing course. To measure effectiveness of SI, a diagnostic essay (EDE) was administered to the English 101 students, based on a common essay prompt and scored holistically by the entire English faculty. Results suggested that SI helped SI participants to improve writing skills (gain of 15.7% on the EDE vs. 14.0% for courses taught by the same professor but without SI), earn higher mean final course grades (2.6 vs. 2.5, reduce failure rates (13.8% vs. 16.0%), and lower course withdrawal rates (6.1% vs. 6.9%).

Peters, C. B. (1990). Rescue the perishing: A new approach to Supplemental Instruction. In The Changing Face of College Teaching (pp. 59-68). San Francisco, CA: Jossey-Bass,

Inc. (ERIC Document Reproduction Service No. ED 344 539)
This chapter describes an experiment of providing an a modified version of the Supplemental Instruction program at the University of Rhode Island (Kingston, RI). The author is an associate professor of sociology and anthropology. Rather than hiring student SI leaders to facilitate the SI sessions, the course professor performs the task. According to the author, these out-of-class sessions appear similar to ones facilitated by student leaders. Participating students report satisfaction with the sessions.

Price, M., & Rust, C. (1994). Introducing Supplemental Instruction in business courses in a modular programme. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 31-36). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/mpbusi94.htm
Oxford Brookes University in the United Kingdom is using the Supplemental Instruction program in the School of Business. SI was implemented with larger business courses (400 to 500 students) to enhance the learning environment for the students enrolled in these elective courses that are outside their field of study. Rather than paying the SI leaders, they were given academic credit for the experience. The research studies of students enrolled in the targeted courses suggested a positive correlation ($p < .05$) between SI participation (two or more times) and higher final course grades (Introduction to Business, 61.4 percentile vs. 56.2 percentile for non-SI participants; Managing Concepts, 60.7 vs. 54.6; and Changing Environment of Business, 56.6 vs. 46.2) . The SI participants attracted a higher percentage of female and older students than represented in the total class.

Rich, C. E., Williford, A. M., & Kousaleous, S. L. (1997). Supplemental Instruction at Ohio University: Improving student performance. In P. L. Dwinell, & J. L. Higbee (Eds.), Developmental Education: Enhancing student retention (pp. 37-44). Carol Stream, IL: National Association for Developmental Education. Available: http://www.umkc.edu/cad/si/sidocs/ mrmpap97.htm
This study of student performance compared final course grades of students who attended Supplemental Instruction (SI) study sessions with grades of those who did not attend SI study sessions during the period of Fall 1993 through Spring 1995. Results indicated that, with gender and aptitude controlled, students who attended SI study sessions generally finished the targeted course with higher grades than students who did not attend, and that frequent attendees completed courses with final course grades that were generally higher than infrequent or non-attenders. Students who most need academic support, as identified by lower aptitude scores, comprised a majority of attenders. Poor performance, early withdrawal, and failure rates were lower among SI attenders than among non-attenders for most courses in which SI was offered.

Richardson, S. (1994). How Supplemental Instruction came to Britain. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction

(pp. 15-16). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/srhist94.htm
The author describes the role of Dennis Congos -- a Certified SI Trainer -- in introducing the Supplemental Instruction model at Kingston University in the United Kingdom.

Romoser, M. A., Rich, C. E., Williford, A. M., & Kousaleous, S. L. (1997). Supplemental Instruction at Ohio University: Improving student performance. In P. L. Dwinell, & J. L. Higbee (Eds.), Developmental Education: Enhancing student retention (pp. 37-44). Carol Stream, IL: National Association for Developmental Education.
This study of student performance compared final course grades of students who attended Supplemental Instruction o(SI) study sessions with grades of those who did not attend SI study sessions during the period of Fall 1993 through Spring 1995 at Ohio University (Athens, OH). Results suggested that, with gender and aptitude controlled, students who attended SI study sessions generally finished the targeted course with higher grades and lower rates of withdrawal than students who did not attend, and that frequent attenders (five or more times per academic term in one course) completed courses with final course grades that were generally higher than moderate (two to four times) infrequent (one time only) or non-attenders. For example, during Fall 1994 the following results occurred for higher aptitude students: non SI, 2.55; infrequent, 2.55; moderate, 2.73; and frequent, 2.95. For lower aptitude students for the same academic term: non SI, 1.94; infrequent, 2.09; moderate, 2.27; and frequent, 2.41. Through student evaluations three factors emerged that influenced student attendance: (1) course content must be perceived as challenging, but manageable; (2) cooperating faculty member must endorse both the SI program, SI leader, and encourage students to attend SI; and (3) students must have some understanding of what SI is and what to expect at a study session. A locally-produced SI introductory video has been a helpful promotional took, second only to participant endorsements.

Rust, C., & Wallace, J. (Eds.). (1994). Helping students to learn from each other: Supplemental Instruction. Birmingham, England: Staff and Educational Development Association
This monograph provides a comprehensive review of Supplemental Instruction in the United Kingdom: overview of SI; background of introduction of SI; use of SI for staff and faculty development; benefits of SI for both the students and the SI leaders; statistical research reports; and eight case studies illustrating the experience of implementing SI into British higher education courses.

Spencer, G., & Wallace, J. (1994). Conceptualizing Supplemental Instruction. In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 9-14). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/gsconc94.htm
This article places Supplemental Instruction into its appropriate role within British higher education. SI is compared and contrasted with collaborative learning, tutorials,

and roles of the instructor. It is emphasized that SI focuses on the student learning process.

Stratton, C. B. (1998). Transitions in Developmental Education: Interviews with Hunter Boylan and David Arendale. In P. L. Dwinell, & J. L. Higbee (Eds.), The Role of Developmental Education in Preparing Successful College Students (pp. 25-36). Columbia, SC: The National Association for Developmental Education and the National Center for the Study of the Freshmen Year Experience and Students in Transition.
In this book chapter the author interviews two leaders in the field of developmental education. Hunter Boylan directs the National Center for Developmental Education. David Arendale directs national dissemination of Supplemental Instruction. Both have served as past presidents of NADE. Arendale talks about how developmental education must be "mainstreamed" into the college curriculum rather than continuing with the current model of separate tracks of courses and support for students who need academic assistance. Supplemental Instruction and Video-Based Supplemental Instruction are cited as examples for embedding academic assistance into college-level courses. Brief overviews are provided for both programs. He suggests that SI and VSI present an acceptable way for accomplishing the mission of developmental education which is politically acceptable to policy makers at the institution, state, and national level.

Taylor, G. T., Healy, C. E., & Macdonald, M. (1994). Engineering educational development: Raising the quality through partnerships. In J. Wallace (Eds.), Kingston University HEFCE Supplemental Instruction Project (pp. 225-230). London, England: Kingston University. Available: http://www.umkc.edu/cad/si/sidocs/gtengi94.htm
The changes which face education today make it essential that quality is raised by moving from a teaching to a learning culture. Supplemental Instruction (SI) was used to create a partnerships between student, staff and employers working together to develop a learning environment in the Department of Energy and Environmental Technology at Glasgow Caledonian University in Glasgow, England. Students indicated the following reasons for SI participation: students want to work in peer groups; students recognize the academic difficulty of their courses; and students believe that peer groups are a source of information and help for them. In an evaluation of the SI program, SI leaders indicated growth in the following areas: verbal and nonverbal communications, learning techniques, interpersonal communication skills, consideration of college major change to a teaching career, and gaining employment skills that makes them more attractive to potential employers.

Wallace, J. (1994). Kingston University HEFCE Supplemental Instruction Project: 1993-94. London, England: Kingston University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report review four years of development and research into the use of Supplemental Instruction at Kingston University in the United Kingdom. An additional emphasis area

for the SI model has been with staff and faculty development. Included are reports from Kingston University, Glasgow Caledonian University, University of Central Lancashire, Luton University, University of Brighton, and Oxford Brookes University.

Wallace, J. (1994). Provoking the teaching and learning debate. In J. Wallace (Eds.), Kingston University HEFCE Supplemental Instruction Project (pp. 99-117). London, England: Kingston University. Available: http://www.umkc.edu/cad/si/sidocs/jwtelr94.htm
This chapter contains responses from several educators regarding the impact of Supplemental Instruction (SI) with improving the learning environment for college students in the United Kingdom. The SI program has attracted considerable attention from student unions and unionized teacher trade unions since it has become another partner in the learning process. UK educators who have implemented the SI program have been very careful to position SI as an enhancement to the learning process rather than an alternative to traditional means of delivering instruction to students. Teaching and learning are carefully separated with the UK system.

Wallace, J. (1996). Peer tutoring: A collaborative approach. In S. Wolfendale, & J. Corbett (Eds.), Opening doors: Learning support in higher education (pp. 101-116). London, England: Cassell Publishers. Available:
http://www.umkc.edu/cad/si/sidocs/jwpeer97.htm.
This chapter is a description of how the Supplemental Instruction program was customized for use in the United Kingdom. The key to the success of the program was effective awareness raising for academic staff, the training of the student leaders and the effective management of the scheme. Quotations from SI leaders and faculty members cite a variety of reasons for support for the SI program.

Wallace, J., & Rye, P. D. (1994). What is Supplemental Instruction? In C. Rust, & J. Wallace (Eds.), Helping students to learn from each other: Supplemental Instruction (pp. 7-8). Birmingham, England: Staff and Educational Development Association. Available: http://www.umkc.edu/cad/si/sidocs/jwwhat94.htm
This article provides a short overview for how the Supplemental Instruction program is most often implemented in the British higher education system.

Widmar, G. E. (1994). Supplemental Instruction: From small beginnings to a national program. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 3-10). San Francisco, CA: Jossey Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/ jbhist94.htm
The chief student affairs officer at the University of Missouri-Kansas City offers a historical review of the development and implementation of Supplemental Instruction (SI). The SI program was first implemented with the Dental, Medical, and Pharmacy schools since an unacceptable rate of students were leaving the institution. Later the SI program was expanded to the College of Arts and Sciences. The author describes the administrative and political issues that must be addressed to meet issues important to administrators and faculty members. Since the Division of Student Affairs views its

programs as cocurricular rather than extracurricular, administrative placement of the SI program with Student Affairs was a natural fit for the campus. Faculty and administrative support for SI remains for the following reasons: SI supports cultural diversity; SI supports critical thinking; SI supports student retention and academic performance; and SI is both replicable and adaptable.

Widmar, G. E., & DeBuhr, L. (1987). Supplemental Instruction: Meeting the academic development needs of students at urban universities. In A. Artibise, & W. Fraser (Eds.), New Directions for Urban Universities: International Perspectives . Winnipeg, Canada: Institute of Urban Studies.
This book chapter discusses the use of Supplemental Instruction (SI) as a strategy to support the academic success of students.

Wilcox, F. K. (1993). Reasons educators and students choose Supplemental Instruction. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Improving first-year student success in high-risk courses 2nd ed., (pp. 27-30). Columbia, SC: National Resource Center for The Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service, No. ED 354 839)
Available: http://www.umkc.edu/cad/si/sidocs/dachoo93.htm
In this chapter a variety of factors are identified that have been reported as significant in generating interest by educators and students with Supplemental Instruction. These factors include: SI supports high academic standards; cost-effectiveness of the SI program; meets immediate pragmatic needs of students; SI avoids a remedial/developmental image; SI sessions are non-threatening for students; SI sessions develop a community of supportive learners; and SI helps students to develop transferable study strategies..

Wilcox, F. K. (1995). Supplemental Instruction and efficiency in learning. In M. T. Keeton, B. Mayo-Wells, J. Porosky, & B. Sheckley (Eds.), Efficiency in adult higher education: A practitioner' handbook (pp. 102-107). College Park, MD: The University of Maryland University College, Institute for Research on Adults in Higher Education.
This chapter provides an overview of the Supplemental Instruction (SI) program. The SI program is efficient since it provides a highly effective academic support program (higher grades, lower course withdrawals, higher reenrollment and graduation rates) for a moderate cost by employing student facilitators. Since the SI sessions occur outside of class, it preserves the time available for the course professor and allows them to more efficiently use their class time addressing the course material rather than using a portion of the time to address issues best addressed during the SI sessions.

Wilcox, F. K. (1999). Supplemental Instruction Leader Manual. Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This manual is used during training workshops to equip faculty and staff members from

other postsecondary institutions to implement their own Supplemental Instruction (SI) programs. The interactive manual covers a wide range of practical issues for someone who wishes to lead their SI sessions. The manual is used during the SI Supervisor Workshops that are held in Kansas City, MO on a quarterly basis and during custom workshop sessions that are held on individual campuses. The workshops are designed to train institutional leaders to return to their home campus and to train their own SI leaders using this and other materials.

Wilcox, F. K. (1999). Supplemental Instruction Supervisor Manual. Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This manual is used during training workshops to equip faculty and staff members from other postsecondary institutions to implement their own Supplemental Instruction (SI) programs. The interactive manual covers a wide range of practical issues for someone who wishes to start their SI program. The manual is used during the SI Supervisor Workshops that are held in Kansas City, MO on a quarterly basis and during custom workshop sessions that are held on individual campuses.

Zerger, S. (1994). Supplemental Instruction in the humanities. In D. C. Martin, & D. Arendale (Eds.), Supplemental Instruction: Increasing achievement and retention (pp. 41-52). San Francisco, CA: Jossey-Bass, Inc. Available: http://www.umkc.edu/cad/si/sidocs/jbhum194.htm
Supplemental Instruction sessions in the humanities must differ from those in other disciplines because the epistemology and the axiology differ: a) prior knowledge; b) audience expectations; c) the nature of claims or evidence. Some of the issues important for many SI sessions: need to focus on the big picture; expansion of information rather than data reduction (common in science); careful use of language; importance of writing activities; and role of authority and evidence.

Section Three: Journal Articles

Blanc, R. A., DeBuhr, L., & Martin, D. C. (1983). Breaking the attrition cycle: The effects of Supplemental Instruction on undergraduate performance and attrition. Journal of Higher Education, 54(1), 80-89 Available: http://www.umkc.edu/cad/si/sidocs/dmbrka83.htm
This article concerns an evaluation of the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. The research study looked at the academic performance of 746 students enrolled in seven Arts and Sciences courses during Spring 1980. A variety of research studies were completed using data gathered from this and subsequent academic terms. SI participants in comparison with non-SI participants of similar demographic background earned higher levels of academic achievement. The first study looked at mean final course grades and the rate of D, F and course

withdrawals for three groups: SI participants, non-SI participants, and motivational control non-SI participants. Students assigned to the motivational control group were those who, on a Likert scale, indicated higher interest in attending SI sessions, but who were prevented from attending because of scheduling conflicts (e.g., work, class). The final course grades favored the SI participants (2.50, DFW rate of 18.4%, p< .01) over the motivational control non-SI group (2.36, DFW rate of 26.5%) and other non-SI group (1.57, DFW rate of 44.0%). SI and non-SI participants were tracked regarding reenrollment rates for two succeeding academic terms. In both cases the results favored the former SI participants (Fall 1980: SI 77.4% vs. non-SI 67.3%; Spring 1981: SI 73.2% vs. non-SI 60.0%). When the students were separated by quartile groups on the basis of standardized entrance exams, SI participants outperformed their counterparts (Top quartile: final grade SI 3.10 vs. non-SI 2.30, reenrollment following term SI 86% vs. non-SI 78%; Bottom quartile: final grade SI 1.72 vs. non-SI 0.88, reenrollment following term SI 74% vs. non-SI 62%). There were long-term reductions in the percentage of D, F and withdrawals in the courses where SI was offered to students (from 34% before introduction of the SI program down to 18% during the SI program's second year). This article was the first one published outside of developmental education publications to gain national attention concerning the SI model.

Blanc, R. A., & Martin, D. C. (1994). Supplemental Instruction: Increasing student performance and persistence in difficult academic courses. Academic Medicine: Journal of the Association of American Medical Colleges, 69(6), 452-454 Available: http://www.umkc.edu/cad/si/sidocs/ dmamed94.htm
The authors describe the use of Supplemental Instruction (SI) with medical students to earn higher final course grades in historically difficult courses. The SI process has been used successfully with students who are preparing for the USMLE Step I examination. The authors state that SI can strengthen a prematriculation program for students whose MCAT scores place them in the high-risk category for completing the medical school curriculum. To maximize learning efficiency for students in the prematriculation program, the authors suggest that a small-group preview session precedes each lecture and a small-group review follows. The article concludes with a short overview of Video-based Supplemental Instruction (VSI).

Bocock, J. (1993, February). Supplemental Instruction: Striking a balance in the curriculum. The Lecturer (The University & College Lecturers' Union), 7
The Supplemental Instruction (SI) program is cited by Jean Bocock, Assistant Secretary for Higher Education in the United Kingdom, as one way to deal with a number of pressing educational needs: dealing with rising student to teacher ratios [8.5:1 in 1980 to almost 20:1 today]; shifting towards student-centered learning; and capitalizing upon the resources of students to teach other students. One concern expressed by NATFHE, the University & College Lecturers' Union, is that SI not be used as a cheap alternative to hiring trained staff and paying them a proper salary.

Boylan, H. R. (1999). Exploring alternatives to remediation. Journal of Developmental Education, 22(3), 2-4, 6, 8, 10
In this journal article Dr. Hunter Boylan, Director of the National Center for Developmental Education , the author explores five alternative ways to serve students who previously may have been served through traditional developmental education courses: (1) freshman year seminars; (2) Supplemental Instruction; (3) learning communities and collaborative learning; (4) paired courses; and (5) critical thinking instruction. For students that do not need the extensive time required by full academic-term length developmental courses, the five alternatives explored in the article might be as effective with the benefit of shorter investment of time, personnel, and money. The author cited three studies where SI has been especially effective with developmental students: (1) Blanc, DeBuhr, & Martin, 1983; (2) Commander, Stratton, Callahan, & Smith, 1996; and (3) Ramirez, 1997.

Bridgham, R. G., & Scarborough, S. (1992). Effects of Supplemental Instruction in selected medical school courses. Academic Medicine: Journal of the Association of American Medical Colleges, 67(10), 569-571 Available: http://www.umkc.edu/cad/si/sidocs/ssmed92.htm
This article describes the use of Supplemental Instruction (SI) in the College of Human Medicine of Michigan State University with courses in biochemistry, physiology, pharmacology, genetics, gross anatomy, and histology. SI attendance was mandatory for all first- and second-year students who are on probation and optional for all others. A study of students enrolled in Biochemistry, Physiology, and Pharmacology courses between 1988 and 1990 suggests that SI attendance was correlated with higher mean final course grades. The authors suggest about twenty specific activities for SI sessions. In general, SI participants earned higher mean final course grades. The authors mentioned that the success of the SI program has encouraged the College to maintain an admissions policy that encourages a more diverse student population.

Burmeister, S. L. (1996). Supplemental Instruction: An interview with Deanna Martin. Journal of Developmental Education, 20(1), 22-24, 26 Available: http://www.umkc.edu/cad/si/sidocs/ dminte96.htm
This is the transcript of an interview with Dr. Deanna Martin, creator of the Supplemental Instruction (SI) model. Issues discussed in the interview include: new innovations in the SI model; cost effectiveness of the model; use of SI in other countries; current educational climate in higher education; disagreement with mandatory testing and placement of students into tracked developmental education programs; challenges with lecture-based educational delivery systems with increasing student learning mastery; and future opportunities for use of SI and Video-based Supplemental Instruction.

Collins, W. (1982). Some correlates of achievement among students in a Supplemental Instruction program. Journal of Learning Skills, 2(1), 19-28

This article examined the effectiveness of Supplemental Instruction (SI) at Cornell University by comparing the course-grade earned in four subjects (chemistry, mathematics, biology, and physics) and the GPA of 301 students enrolled in these courses with College Board Scholastic Aptitude Scores (Verbal and Math), assistance requested by the student, and high school rank. Even when SAT-scores and high school rank are held constant as in the standard multiple regression procedure used with this study, the results suggest that SI attendance made a significant contribution to the academic achievement of SI participants both with the individual course (Biology, Chemistry Mathematics) and the overall cumulative GPA. The research suggested when comparing students of equivalent SAT scores and high school rank, the following predictions would be warranted, SI participants would receive the following higher grades when compared with the non-SI counterparts: one full letter grade higher in Biology; three-fourths of a letter grade higher in Mathematics; and one-half letter grade higher in Chemistry. There were no predictive variables regarding final course grades in physics. The authors suggest that the strategies learned in SI are transferred to other courses and help improve academic achievement in those courses as well. The SI program is aimed at students admitted to Cornell through the Committee on Special Education Projects (COSEP). Most of these students are members of ethnic groups or from disadvantaged backgrounds.

Commander, N. E., & Smith, B. D. (1995). Developing adjunct reading and learning courses that work. Journal of Reading, 38(5), 352-360
This article explores a variation of the Supplemental Instruction (SI) program to provide more time for students to develop reading and learning strategies. Rather than using the voluntary peer facilitated study review sessions based on the SI model, the learning assistance center at Georgia State University (Atlanta, GA) chose to create an adjunct course model. Like the SI model, a historically-difficult content course (History 113) was paired with an adjunct course (Learning Strategies for History or LSH). Students enrolled in both courses. Unlike SI, most students enrolled in the strategies courses were developmental. The LSH required students to apply the learning strategies to the companion History 113 course. Considering that the LSH students were less prepared academically than the general student population in the History 113 course, data suggests that the adjunct course was helpful since three quarters of the students passed the History 113 course with a final course grade of C or higher and their mean final course grade (2.3) with nearly the same as the other students (2.5). One of the recommendations for potential adopters of this model is that all students in the LSH course be enrolled in the same section of the content course (e.g., History 113). Failure to do so creates confusion in the LSH course if there are multiple sections of the content course with professors who may be teaching at with different rates, textbooks or content material.

Commander, N. E., Stratton, C. B., Callahan, C. A., & Smith, B. D. (1996). A learning assistance model for expanding academic support. Journal of Developmental Education,

20(2), 8-10, 12, 14, 16
This article provides a model for expanding the role of academic support in higher education. A learning program that formerly offered primarily developmental classes and a tutorial center later expanded to include course-related services of Supplemental Instruction (SI) and adjunct courses at Georgia State University (Atlanta, GA). During Fall 1993 a study in Political Science 101 suggested that SI was correlated with higher mean final course grades (2.7 for regular SI attenders, 2.4 for occasional attenders, and 1.9 for non-SI attenders). The authors suggest ten steps for expanding academic support: 1) consider campus uniqueness; 2) identify population; 3) identify courses; 4) build faculty support; 5) staff adjunct courses with seasoned faculty and SI learning sessions with thoroughly trained leaders; 6) market programs at several levels; 7) provide feedback to the professor of the content course throughout the quarter or semester; 8) involve the administration; 9) keep records; and 10) disseminate information.

Congos, D. H., Langsam, D. M., & Schoeps, N. (1997). Supplemental Instruction: A successful approach to learning how to learn College Introductory Biology. The Journal of Teaching and Learning, 2(1), 2-17
This article reviews the use of Supplemental Instruction (SI) at the University of North Carolina at Charlotte with students enrolled in Introductory Biology (Biology 1110), the first course of a two semester introductory biology sequence for non-majors. The data from Fall 1990 and Spring 1991 suggests that participation in SI has a positive impact on student academic performance. The final score for the SI participants was higher (Fall 1990: 2.72 vs. 1.94; Spring 1991: 2.83 vs. 1.95); the rate of A, B and C final course grades was higher (Fall 1990: 86.3% vs. 65.4%; Spring 1991: 78.6% vs. 62.5%); and the rate of D, F and course withdrawals was lower (Fall 1990: 13.7% vs. 34.6%; Spring 1991: 21.4% vs. 37.5%). A variety of additional statistical tests were conducted to test for the intervening nature of other variables (e.g., SAT verbal, SAT quantitative, SAT sum of SATV and SATQ, high school rank, predicted grade point average before matriculation based on SAT verbal and quantitative). After these additional tests, participation in SI was still found to be statistically significant.

Congos, D. H., & Schoeps, N. (1993). Does Supplemental Instruction really work and what is it anyway? Studies in Higher Education, 18(2), 165-176
The authors describe the Supplemental Instruction (SI) program as it operates at the University of North Carolina at Charlotte from 1987 to 1990. The initial portion of the article provides a general overview of the SI program. The Fall 1988 research study suggested that SI participation was positively correlated with higher mean final course grades (2.391 vs. 1.894) and lower withdrawals (17.7% vs. 37.9%). These favorable results are so in spite of the fact that SI attendees enter college with lower predicted academic potential.

Congos, D. H., & Schoeps, N. (1994). Does Supplemental Instruction really work and what is it anyway? Educational Administration Abstracts, 29(1), 52-53
This is a short summary of the authors article -- Does Supplemental Instruction really work and what is it anyway? -- that originally appeared in Studies in Higher Education (1993), vol. 18, no. 2, pp. 165-176. The authors describe the Supplemental Instruction (SI) program as it operates at the University of North Carolina at Charlotte from 1987 to 1990. The Fall 1988 research study suggested that SI participation was positively correlated with higher mean final course grades (2.391 vs. 1.894) and lower withdrawals (17.7% vs. 37.9%).

Congos, D. H., & Schoeps, N. (1997). A model for evaluating retention programs. Journal of Developmental Education, 21(2), 2-4, 6, 8, 24
This article presents a step-by-step model for analyzing the impact of retention programs on students. Data from a Supplemental Instruction (SI) program is used to demonstrate how this research is done. The seven steps include: identify the relevant variables; for each student in the class, gather the data on the independent variables chosen in Step 1; maintain on-going data on the information needed for the dependent variables; enter the data into a computer in an organized format that eases analysis; define the criteria that determines who is an attendee or participant; analyze the data using an appropriate data analysis software package; and set up the results in a readable manner, including relevant narratives necessary to explain and clarify the data. To illustrate the seven-step method, the researchers analyze the SI data from their campus regarding improved final course grades, reduction of D/F/W, and projected cost savings.

Congos, D. H., & Schoeps, N. (1998). Inside Supplemental Instruction sessions: One model of what happens that improves grades and retention. Research and Teaching in Developmental Education, 15(1), 47-61
After providing an overview of the Supplemental Instruction (SI) model, the authors describe three basic modes of operation in SI sessions: 1) building complete and accurate lecture notes; 2) formulating possible examination questions and answers; 3) conduct post examination survey. The cost effectiveness of the SI program was calculated on the basis of increased retention rates of SI participants. A study was conducted at the University of North Carolina at Charlotte with students enrolled in Introductory Biology (Biology 1110), the first course of a two semester introductory biology sequence for non-majors. The data from Fall 1990 suggests that participation in SI has a positive impact on student academic performance. The final score for the SI participants was higher (2.59 vs. 1.94); the rate of A, B and C final course grades was higher (86.3% vs. 65.5%); and the rate of D, F and course withdrawals was lower (13.7% vs. 34.5%). A variety of additional statistical tests were conducted to test for the intervening nature of other variables (e.g., SAT verbal, SAT quantitative, SAT sum of SATV and SATQ, high school rank, predicted grade point average before matriculation based on SAT verbal and quantitative). After these additional tests, participation in SI was still found to be statistically significant.

Congos, D. H., & Schoeps, N. (1999). Methods to determine the impact of SI programs on colleges and universities. Journal of College Student Retention, 1(1), 59-82. Direct reprint requests to: Dennis H. Congos, Supplemental Instruction Coordinator, University of Central Florida, Student Academic Resource Center, PC1 102, Orlando, FL 32816-3115.
This article presents three categories of approaches to assess the impact of Supplemental Instruction (SI) on an institution: anecdotal information, descriptive statistics, and inferential statistics. For SI programs required to justify their existence, the methods in this article presents assessment devices from simple testimony to rigorous inferential statistical data.

Donelan, M. (1995). An enterprising start: Innovative teaching and learning at the University College London. Universe: Innovation and Excellence at the University of Central Lancashire, 7(1), 14-15
This article describes a number of innovative learning practices being implemented at the University College London (the largest and oldest college in the federal University of London). Supplemental Instruction (SI) is one of the featured learning strategies at UCL. Paul Kohler, Sub-Dean in the Faculty of Laws cites benefits of the SI program that include: facilitates students' learning and understanding; prepares them for employment since they will have better skills for learning and applying new concepts.

Donelan, M., & Kay, P. (1998). Supplemental Instruction: Students helping students' learning at University College London (UCL) and University of Central Lancashire (UCLAN). The International Journal of Legal Education, 32(3), 287-299
The Supplemental Instruction (SI) program is used to meet the needs of first year students in their academic and personal development within the Law faculties of the University College London (UCL) and the University of Central Lancashire (UCLAN). The United Kingdom expansion of the SI model develops more holistically in cognitive and affective aspects of learning for both SI participants and SI leaders. The three law courses that had SI attached to them were English Legal System, Obligations 1, and Lawyers' Skills. There are several variations of SI within the UK use of the model: SI leaders are instructed to focus on facilitating the group discussion and not presenting course content material; SI leaders academic credit for their service through evaluation of a portfolio. Higher grades were recorded for SI participants and SI leaders when compared with non-participants. Interviews with SI participants revealed the following SI program benefits: enhanced academic understanding; enjoyed active learning; opportunity to clarify concepts; enjoyed the social aspects of meeting students of other classes; and developed personal confidence and reassurance. Benefits cited by the SI leaders included: opportunity to help others; developed communication, presentation, and leadership skills; increased knowledge of the academic content of the course.

Eastmond, J. N. (1997). Five academic development programs in the Eastern Cape Province: Reactions of an American academic in South Africa. Educational Technology

Research & Development, 45(3), 129-134
This article describes the academic development programs at four tertiary institutions in South Africa (University of Port Elizabeth, Port Elizabeth Technikon, Rhodes University, and the University of Ft. Hare) as well as the development of a fifth new program at Border Technikon. Topics include cross-cultural differences; interviews; Supplemental Instruction (SI) that combined staff development and student academic development; integration of media support; and stages of program development. The author describes how a former SI student leader at the University of Port Elizabeth had been hired as an instructor at Border Technikon. Based on interviews, the previous experience as SI leader had a direct impact upon the new instructor's style of instructional delivery which utilized a high degree of academic inquiry and guided classroom discussion. The author commented about how the SI program was able to combine both staff development and student academic development. While this was a common pattern with South African institutions, the author commented that this was largely unknown in the U.S. The author subscribed to a four-stage model for faculty development previously articulated by DeBloois and Alder, 1974: 1). Awareness: through guest speakers, newsletters, and similar low impact activities; 2). Faculty support: small grants to faculty, seminars or workshops on aspects of tertiary teaching; 3). Faculty skills: larger investment in course development, more extensive involvement of individual faculty; and 4). Departmental curriculum: extensive development of a series of courses in the curriculum, organizational development efforts to change the prevailing reward structure.

Eastmond, J. N., Bartlett, G., & Terblanche, N. (1997). Planning for student involvement in a program of Supplemental Instruction. Educational Technology Research and Development, 45(3), 134-140
Supplemental Instruction (SI) is used at Border Technikon (South Africa) to increase student achievement in the Accounting and Management academic departments. The article describes the ways student involvement has been maintained through enlisting support from the Student Representative Council (SRC). Article topics include: training, funding considerations, effectiveness, student response, and student achievement results. A grant provided through the United States Agency for International Development (USAID) Tertiary Education Linkages Project (TELP) was used to start the SI program. The grant's major goals are to enhance staff and student development, both of which were enhanced through the SI program. SI leaders reported the following benefits to them from participation in the SI program: gained confidence in public speaking; developed new teaching strategies; and enjoyed more interaction with the course lecturers. Surveys of SI participants identified the following suggestions to improve the SI program: assign the same place each week for SI sessions; SI leaders should prepare before SI sessions to provide structure in case the attending students do not have a full agenda of items; SI leaders should receive additional interpersonal discussion group skill training; and that times should be set aside in class scheduling to allow for SI sessions to be scheduled. Analysis of final course examinations revealed

that the number and percent of students who passed the final examination had doubled after the introduction of the SI program. The author found stated that this was remarkable considering that the class size had increased significantly, straining the ability of the course instructor to deal with the additional workload of students.

Eig, J. (1997, Spring). Supplemental Instruction programs: An effective way to increase student academic success? Journal of Teh Indiana University Student Personnel Association, 11-15
Supplemental Instruction (SI) is used at Indiana University (Bloomington) to increase academic achievement and retention. This article provides a basic overview of the SI program and data concerning its effectiveness at the institution. Challenges for implementing SI include: administratively SI programs require considerable coordination; SI leaders must be carefully selected for their academic and interpersonal skills; SI leaders must be trained prior to the academic term and receive supervision throughout the term; students must make a time commitment to attend SI sessions; and the institution must have sufficient professional staff to supervise the SI program.

Etter, E. R., Burmeister, S. L., & Elder, R. J. (in press). Supplemental Instruction in Accounting Principles courses. Accounting Education: Journal of Theory, Practice, and Research.
This study reports on student performance, and failure and withdrawal rates for 9,053 students enrolled in 132 Principles of Accounting classes from 21 four-year colleges and universities that have adopted the Supplemental Instruction (SI) program. The overall SI participation rate was 26.8 percent. After providing an overview of the SI model, the data study concerning accounting occupies the rest of the paper. SI participants were found to have statistically significant higher average course grades (2.44 vs. 2.12), lower failure rates (5.9% vs. 15.3%) and lower withdrawal rates (10.6% vs. 19.8%) than non-participants enrolled in the target courses.

Farmer, B. (1991, Autumn). Helping learners to help themselves. Teaching and Learning Bulletin, (7), 2-3
This article describes the use of Supplemental Instruction (SI) at several institutions in England. The author, a member of the Learning Methods Unit at Birmingham Polytechnic, describes research that was shared at a SI workshop coordinated by Kingston Polytechnic and the World Wild Life Fund for Nature.

Fitzgerald, N. (1997). The dropout dilemma. Careers and Colleges Magazine, 18(2), 14-17, 26
This article reviews the causes and cures for the high rate of college drop outs. The author interviewed a number of people for the article. One of those interviewed and quoted in the article is David Arendale, National Project Director for Supplemental Instruction (SI). Arendale describes how SI and its newest variation, Video-based Supplemental Instruction help students to integrate "what to learn" with "how to learn it.".

Fjortoft, N., Bentley, R., Crawford, D., & Russell, J. C. (1993). Evaluation of a Supplemental Instruction program at a college of pharmacy. American Journal of Pharmaceutical Education, 57(3), 247-251

The purpose of this study was to evaluate, in terms of improved final grades, the effectiveness of the Supplemental Instruction program with students enrolled in a required first year pharmacy course at the University of Illinois at Chicago College of Pharmacy. Regular SI attendance was found to be significantly and positively related to final course grades for minority students. The authors postulate that the SI program might have been more effective if the SI program had been started the first week of class rather than being delayed until the third week. An additional factor that may have diminished the statistical impact of the SI program was that funds were not available to hire additional SI leaders since the average SI attendance at every session through the academic term was 52. The authors speculate that smaller groups might have been more helpful than these large groups since students could have been more active and be able to vocally participate with others.

Gaddis, B. A. (1994). The science learning center. Education, 115(2), 195-201

This article describes the services provided by the Science Learning Center at the University of Colorado in Colorado Springs. The Center had three primary objectives: (1) to identify the mathematical, computational, and conceptual skills needed by science students; (2) to assist students to master basic conceptual, mathematical, and computational skills that are common to most science disciplines; and (3) to develop skills in the use of basic and specific laboratory instrumentation required in most science disciplines. To help meet the second goal, Supplemental Instruction (SI) was offered in connection with historically-difficult science courses (e.g., physics or organic chemistry). Research studies suggested that SI participants received higher mean final course grades. Since the Center's creation in 1992: the number of students enrolled in basic science classes increased by 12 percent; the number of declared science majors increased by 37 percent; 72.1 percent of students who used services from the Center received a grade of B- or better; cum GPA of students who used the Center's services had an average of 3.03 vs. 2.49 for those who did not; the rate of attrition of science classes dramatically dropped (e.g., Chemistry I, the rate decreased from 39.7 percent to 5.7 percent; Physics III, 16.5 percent decreased to 4.8 percent; Biology I, 16.7 percent decreased to 3.2 percent. SI was one component of a comprehensive Center that contributed to these positive outcomes.

Gunning, F. (1993, February). Supplemental Instruction is not teaching. The Lecturer (The University & College Lecturers' Union), 2

This article describes how Supplemental Instruction (SI) is not used as a replacement for teaching by course instructors. The author is a professional tutor at Kingston University in England and is a member of the teacher's union. The author describes the unique benefits that SI provides for students: peer support; modeling of study strategies; focuses on learning, not teaching. Faculty and tutors that have SI attached to their courses are supportive of the SI program since it provides different services to students than their provide. They see no conflict in roles for them.

Hodges, R. B., Sellers. Diana E, & White, W. G. (1994). Peer teaching: The use of facilitators in college classes. Journal of College Reading and Learning, 26(2), 23-29
This article discusses the use of peer students as facilitators in the learning process. Supplemental Instruction (SI) is cited as another example of these student-led peer groups. The authors cite Maxwell (1992) when stating that SI is the best known and has the widest acceptance of any course-related learning program. A facilitator is defined as a facilitator as an undergraduate teaching assistant engaged in collaboratively teaching a college course alongside the instructor. While facilitators may perform some clerical duties, the focus of their work is to foster student learning. Common activities for facilitators include: through hosting smaller outside-of-class sessions make large classes more personable; turn lecture material by asking questions; share from a student's perspective another way to think about the lecture material; provide individual feedback to students; supervise small student work groups; provide role models of active learning; give encouragement; and change the classroom climate. Critical elements for a successful facilitator: be carefully selected by the instructor and perhaps a team of other student facilitators; training both before and during the academic term; evaluation by student and self-administered surveys.

Jenkins, A. (1994). Thirteen ways of doing fieldwork with large classes/more students. Journal of Geography in Higher Education, 18(2), 143-155
This article describes thirteen strategies for geography instructors to consider to increase instructional effectiveness with large classes. The article is addressed to geography teachers and other field-based subjects in the United Kingdom. Suggestion number suggests finding ways to add new members to the academic staff. Supplemental Instruction (SI) is suggested as a way to involve students in helping to teach each other in large classes.

Kauffman, D., & Wolfe, R. F. (1990). Supplemental Instruction with mentoring support: A vehicle for faculty development. The Journal of Staff, Program, and Organization Development, 8(2), 101-104
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness.

Koch, E., & Mallon, P. (1998). Evaluation of Supplemental Instruction: A performance assessment approach. South African Journal of Higher Education, 12(3), 173-178. Available: Center for Supplemental Instruction, University of Missouri-Kansas City,

5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article about the use of Supplemental Instruction (SI) was originally presented at the South African Association for Academic Development Conference in Bloemfontein, Republic of South Africa. This research investigation assesses the performance of the SI program in terms of efficiency, quality, and effectiveness. Three concern areas were identified: voluntary attendance in SI sessions, unstructured approach in science courses, and ineffectiveness in increasing the pass rate of very under-prepared students. Key factors associated with positive program outcomes included: skill and ability of the SI leader with both facilitation but also knowledge/enthusiasm for the subject; involvement and support of the course lecturer; type of work covered in SI sessions; training both initially and ongoing of SI leaders; and more structure in SI sessions in science and other problem-solving areas.

Kochenour, E. O., Jolley, D. S., Kaup, J. G., Patrick, D. L., Roach, K. D., & Wenzler, L. A. (1997). Supplemental Instruction: An effective component of student affairs programming. Journal of College Student Development, 38(6), 577-586
The effectiveness of Supplemental Instruction (SI) was examined using 11,000 participants enrolled in eight courses at the University of Utah, a large research university. Corelational analyses and analysis of covariance support the hypothesis that SI is an effective program. The data was collected between Autumn 1992 and Spring 1994. Students on average attended about 3.7 times for each academic quarter. There was a positive correlation between higher grades and higher levels of attendance in SI: zero, 2.387; 1 to 2, 2.597; and 3 or more times, 2.848. Though students of various previous levels of academic achievement attended SI in similar patterns, research suggests that SI sessions had the most impact on students with lower previous grade point averages. Additional analysis examined the interaction of SI performance and class size, PGPA and other variables. An unusual finding was that the percent of SI attendance decreased with increasing class size.

Lockie, N. M., & Van Lanen, R. J. (1991). Utilizing Supplemental Instruction to enhance student performance in a freshman level chemistry course. Transactions of the Illinois State Academy of Science, 84(10), 10
This abstract describes the use of Supplemental Instruction (SI) with entry-level chemistry students at Saint Xavier University (Chicago, IL).

Loviscek, A. L., & Cloutier, N. R. (1997). Supplemental Instruction and the enhancement of student performance in economics principles. American Economist, 41(2), 70-76
The authors presented an empirical evaluation of Supplemental Instruction (SI) in an economics principles course at the University of Wisconsin-Parkside. Using a two-equation model and student transcript data readily available to instructors and academic researchers, the authors evaluated the effectiveness of the SI program in economics principles. The analysis explicitly considers the confounding factor of self-selection in program participation. They found that ordinary least squares significantly

underestimates the positive impact of SI. The results suggest that formal programs designed to increase the intensity of instruction can have a demonstrable payoff in the form of increased student learning.

Lundeberg, M. A. (1990). Supplemental Instruction in chemistry. Journal of Research in Science Teaching, 27(2), 145-155
This two-year study (148 students) at the University of Wisconsin (River Falls, WI) was designed to measure some effects of Supplemental Instruction in General Organic and Biological chemistry courses. Goals of the SI program included: develop conceptual understandings; articulate both understandings and misconceptions in a think-aloud fashion; connect, relate, and integrate scientific information; develop confidence and ability in problem solving; and learn how to learn science. Some of the challenges with students are: motivating students to use problem-solving strategies; failure to accurately understand the problem before using a problem-solving strategy; attempt to use rote memory when solving; and failure to integrate new material with old. Quantitative studies suggested that SI contributed to higher mean final grades (2.80 vs. 2.26, $p < .002$) and lower rates of D, F and withdrawals for SI participants. Qualitative studies of SI participant comments suggested that SI was helpful in a variety of ways. In addition, SI leaders maintained journals. Six themes emerged from the journals: accommodating needs of diverse learners; understanding versus memorizing; depth versus breadth of discussion; relationships between ability, knowledge, and confidence; social relationships with students; and challenges to SI leaders' knowledge. The first three of these themes represent tensions that reoccurred several times over the academic term.

Lundeberg, M. A., & Moch, S. D. (1995). Influence of social interaction on cognition: Connected learning in science. Journal of Higher Education, 66(3), 312-335
This article explores the use of Supplemental Instruction (SI) for increasing the academic success of women in science. "Connected knowing" -- a preferred learning environment for women that is a personal, cooperative approach to learning -- is thought by some to more naturally occur in SI sessions rather than the traditional pedagogical style used by most classroom professors. A research study of nursing students at the University of Wisconsin (River Falls) was conducted to test this idea. Qualitative research studies of the SI sessions suggested the following themes: spirit of cooperation, a circle of community, a shift of power to the SI participants, and risk-taking behavior (acknowledge uncertainty, experiment new ideas without fear of lower grades or punishment). Cognitive learning aspects included confirming the capacity for learning (encouragement), calibrated teaching (SI leader adjusted SI session agenda), and connected learning (placing abstract class lectures into context of personal lives). The article author provides several suggestions on how the classroom professor can introduce several of the SI session activities into their lecture sessions.

Martin, D. C., & Blanc, R. A. (1981). The learning center's role in retention: Integrating student support services with departmental instruction. Journal of Developmental and

Remedial Education, 4(3), 2-4, 21-23
This article provides a historical background for the creation of the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. Research studies of SI in a first-year American history course at UMKC during Fall 1980 suggest the following: SI participants earned a higher percent of A and B final course grades (54.1% vs. 38.9%); had a lower rate of D, F and withdrawal grades (21.7% vs. 42.4%); had a higher rate of reenrollment the following academic term (86.2% vs. 72.1%); and there was no statistically significant differences (e.g., prior academic achievement, standardized test scores) between SI and non-SI participants.

Martin, D. C., & Blanc, R. A. (1984). Improving reading comprehension through reciprocal questioning. Life Long Learning, 7(4), 29-31
"Reciprocal questioning" is a technique that promotes active learning. It helps students: a) become aware of the implicit as well as the explicit meaning of a reading passage; b) improve their analytic skills with respect to reading; c) improve their reasoning; and d) strengthen the questioning skills that are integral to comprehension. Reciprocal questioning is adapted from Manzo's "The ReQuest Procedure." Reciprocal questioning is a strategy used as appropriate with Supplemental Instruction or Video-based Supplemental Instruction sessions.

Martin, D. C., Blanc, R. A., & Arendale, D. (1994). Mentorship in the classroom: Making the implicit explicit. Teaching Excellence, 6(1), 1-2 Available: http://www.umkc.edu/cad/si/sidocs/ dament94.htm
Based upon experiences gained through the Supplemental Instruction (SI) program, the authors make a number of suggestions on how faculty members can use SI strategies in their classes. Some suggestions include: remind students of the "big picture" throughout the academic term of the most important concepts; refer to the syllabus during the term so that students will value and use it; share the thinking process that the professor uses to solve the problems with the students; administer a short examination with low grade impact early in the academic term to give students an opportunity to test their comprehension level and encourage them to modify study behaviors and perhaps seek academic support (e.g., SI); provide visual matrices during lectures to give models to students on how to organize the material; and make explicit what is expected on examinations.

Martin, D. C., & Gravina, M. (1990). Serving students where they fail: In class. Thresholds in Education, 16(3), 26, 28-30
This article provides a general overview of the Supplemental Instruction (SI) model. Rather than focusing on "at-risk" students, the authors suggest that the emphasis should be placed on identifying historically difficult courses that create an environment that may be challenging for any student, despite previous academic success in other courses.

Maxwell, M. (1987). Improving student learning skills: An update. Journal of Educational Opportunity, 3(1), 1-9

In an overview of strategies for students to employ in developing their learning skills, the author provides a short overview of the Supplemental Instruction (SI) program. SI is an example of a program that rather than being student-oriented is instead content-oriented and/or process-oriented.

Maxwell, M. (1990). Does tutoring help? A look at the literature. Review of Research in Developmental Education, 7(4), 1-5
The author reviews the research on tutoring and examines the problems of doing research in this area. Research studies generally are unable to show that individual tutoring, by itself, leads to higher grades for developmental students. Some studies suggest tutoring is beneficial for high ability students. Supplemental Instruction is cited as an approach that research suggests does improve student academic achievement.

Maxwell, M. (1992). Cost effective alternatives to tutoring. Journal of Learning Improvement, 1(1), 1-4 Available: http://www.umkc.edu/cad/si/sidocs/mmcost91.htm
The author reviews several academic support programs that serve as alternatives to traditional tutoring since there is very little evidence that generally peer tutoring directly affects the student's grades. The article provides an overview of Supplemental Instruction (SI) and adjunct courses. The article reports on a 1986 data study that examined the use of SI at a geographically diverse collection of 35 institutions that had offered SI to 4,276 students in 154 classes of a variety of academic disciplines. The data suggests SI has a positive impact upon raising final course grades (2.44 vs. 1.78) and reducing D, F and course withdrawal rates (20% vs. 35%) and higher graduation rates within six years for SI participants (30.6% vs. 18.2%). It is suggested that part of the reason for SI's positive impact is that there is immediate transfer of the study strategies to course content.

Maxwell, W. E. (1998). Supplemental Instruction, learning communities, and studying together. Community College Review, 26(2), 1
This study was designed to investigate the extent to which peer relations increased among students who participated in a modified program of Supplemental Instruction (SI) at a large community college in California. SI was modified by using instructors from the regular courses and, to a lesser extent, by financial aid counselors. Only financial aid recipients from 19 courses were invited to attend voluntary SI sessions. This allowed the study to more clearly study the impact of SI with low-income students. SI participants received a $100 grant if they attended weekly for the 16 week academic term (only 22% of SI participants earned the grant). Research suggests that the SI workshops promoted the growth of student study networks. At least 20% to 25% more of the SI students reported studying with other students and joining a study group outside of class.

McCarthy, A., Smuts, B., & Cosser, M. (1997). Assessing the effectiveness of Supplemental Instruction: A critique and a case study. Studies in Higher Education, 22(2), 221-231
This article argues that methods of assessing effectiveness of Supplemental Instruction

(SI) have been inadequate. The authors suggest ways of isolating SI effects on student achievement, and recommends broadening research methods to include qualitative forms of assessment and use of multivariate linear regression analysis of quantitative data. The article concludes with a case study at the University of Witwatersrand, Johannesburg, South Africa that suggests that SI is highly effective in raising academic achievement of students from both low and high previous levels of academic performance. It may be that the authors' concerns are based on an unclear understanding of the differences between the educational systems in South Africa and the U.S. and how student variables are used in data analysis. Also, a more complete review of current published SI research methodology would reveal that many of their suggestions regarding qualitative and quantitative research methodology have already been implemented.

McGlone, F. D. (1996). Student peer mentors: A teaching and learning strategy designed to promote cooperative approaches to learning and the development of lifelong learning skills. Queensland University of Technology Law Journal, 12, 201-220. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of Supplemental Instruction (SI) at two classes in Australia's Queensland University of Technology Faculty of Law. SI was contextualized for use within the law curriculum as was described as a Student Peer Mentor (SPM) program. The program concentrated on improving qualitative learning outcomes for the students: promote student use of deep approaches to learning, develop generic lifelong learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with their peers. Several unique features of SPM are identified: selected classes are not historically difficult, the class instructor and the SPM supervisor are the same person, and that the class has always provided a one hour staff-led small group seminar for each two hours of lecture. Other than those previously noted , many common features are shared by SI and SPM.

Murray, M. H. (1996, November). Alternative to lecturer-centred teaching enhances student learning and costs no more. Academic Staff Development Unit Update (Queensland University of Technology, Australia), 6-7. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This article describes the use of Supplemental Instruction (SI) in the School of Civil Engineering, Queensland University of Technology (Australia). A basic engineering statics course in the first year has been transformed from a traditional lecturer-centered teaching mode into a student-centered resource-based model. Central to this transformation has been the integration of SI into the course. The SI sessions focus on interaction, discussion, and investigation rather than just simple problem solving. Before integration of SI in the course the total class (SI and non-SI students) mean final score was 46, in 1996 after the integration the score increased to 55. These results are based on the aggregated score from four quizzes during the semester, from a spaghetti

bridge design/build/test project, and from a final end-of-semester exam. Based on standardized scores, the students in 1996 were less academically prepared than the ones in 1994 before SI was introduced. The SI participants received a higher mean final percentile grade in each year of the study (1995: 48 vs. 41; 1996: 56 vs. 42). There was a positive increase in final course score and higher levels of SI attendance. Students evaluated the SI session most useful of all course components (SI sessions, 53%; lecture, 22%; text book, 16%; study guide, 13%; and tutorial, 9%). SI leaders mentioned the following benefits of the program for themselves: increased skill in group management; improved public speaking; gained skills in team building; increased group facilitation skills; improved personal time management; and increased interest from potential employers because of skills developed as a SI leader.

Murray, M. H. (1997, October). Better learning through curricular design at a reduced cost. Journal of the American Society of Engineering Education, 1-5. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of Supplemental Instruction (SI) in the School of Civil Engineering, at Queensland University of Technology, Australia. After an initial discussion of the changes economic and educational trends in Australia, the report reviews the use of SI with students in a first year engineering course (Engineering Mechanics 1). It is an introduction to rigid body statics, equilibrium, moments, forces, and properties of plane areas. Using the Australian system of 7 point grading (1 = lowest, 7 = highest), the data suggests that the performance of SI participants was higher than non-SI participants (1995: 3.3 vs. 2.7; 1996: 4.4 vs. 2.8). Due to the use of SI, the course was restructured with a reduction of professor lecture time. This resulted in a lower student unit cost. Before SI's introduction, the student unit cost was more than $51 in 1994 (each week 2 hours of lecture and 1 hour of tutorials) and was reduced to less than $42 in 1997 (each week one hour of lecture, one hour of tutorial, one hour of SI, study guides, computer exercises, and E-mail).

Murray, M. H. (1997). Students, learning resources: An inseparable triad. Australian Journal of Engineering Education, 7(2), 129. Available: Center for Supplemental Instruction, University of Missouri-Kansas City,
5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of Supplemental Instruction (SI) at the School of Engineering, Queensland University of Technology (Australia) with two first year engineering courses. SI is compared with the traditional, lecture-centered model of learning. The introductory engineering courses were reorganized to integrate SI into the learning delivery system. Based on the seven point grading scale employed in Australian education (1 = low; 7 = high), the academic performance of students with SI was raised to 4.3 from the previous level of 3.0 before the introduction of the SI model.

O'Donnell, L. E. (1996). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. International Journal of Special Education, 11(2), 27-32

Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

Patt, G. R. (1996). The best way to learn is to teach. Biosource, 4(2)

This article describes the use of Supplemental Instruction (SI) as a form of peer-group instruction in biology at Southern Illinois University at Edwardsville. SI leaders report benefits for them since it helps them to prepare for comprehensive examinations such as MCAT or GRE as well as developing teaching skills. Data from Fall 1995 reports that those who attended SI session four or more times earned a mean final course grade of a low B, those who attended one to three times earned a C, and those who did not attend any SI sessions earned a high D grade.

Peled, O. N., & Kim, A. C. (1996). Evaluation of Supplemental Instruction at the college level. The Learning Assistance Review: The Journal of the Midwest College Learning Center Association, 1(2), 23-31. Available: ERIC Document Reproduction Service, ED 410 777.

This article analyzed the Supplemental Instruction (SI) model as it was used in 14 sections of the same high-risk biology course between Winter 1990 through Winter 1993 at National-Louis University (Chicago, IL) which is a multicultural, multiethnic university campus. Rather than reviewing a comparison of SI and non-SI attendees within the same class, the comparison was the academic performance of students in classes that had SI available and classes that did not. The researchers believed that this was another way to help control for the possible effects of student motivation. Examination grades indicated that the average grade of students in classes that had SI sessions was significantly higher than that of students in classes where SI sessions were not offered (scale 0 to 100: SI classes, 74.1 percentile vs. 67.6 non-SI classes, p < .05). Within classes that had SI sessions offered for students, SI participants earned a final course grade 12 percent higher than non-SI participants. In classes in which an SI leader was available, the number of students receiving grades below 60 percent decreased; whereas, the number of students receiving grades above 80 percent increased.

Price, M., & Rust, C. (1995). Laying firm foundations: The long-term benefits of Supplemental Instruction for students in large introductory courses. Innovations in Education and Training International, 32 (2), 123-130
This article contains the results of the use of Supplemental Instruction (SI) to support student learning in business modules at Oxford Brookes University in the United Kingdom. The courses were selected due to their large size and the need to ensure mastery of course material that was prerequisite for the next course in the sequence. Quantitative and qualitative studies in 1993-94 suggest that SI was beneficial in increasing mean final course grades in the courses supported by SI (Introduction to Business: 61.4 percentile for SI participants vs. 56.2 percentile for non-SI; Managing Concepts: 60.7 vs. 54.6; Changing Environment of Business: 59.6 vs. 46.4). Further analysis showed that there was no correlation between entry qualifications and performance in the classes. In comparison with non-SI participants, former SI participants earned mean final course grades that were higher in subsequent courses in the business sequence that did not have SI support provided (54.9 percentile for former SI participants vs. 48.8 percentile for former non-SI). This finding was confirmed through interviews with students who reported using learning strategies from SI sessions in other classes. This suggests that SI provided transferable benefits for additional courses in the sequence.

Ramirez, G. M. (1997). Supplemental Instruction: The long-term impact. Journal of Developmental Education, 21(1), 2-4, 6, 8, 10, 28
This study addresses two questions about the impact of Supplemental Instruction (SI) on students in a large urban university (California State University, Long Beach): what academic performance benefit is realized beyond the target course supported by SI, and whether SI participation strengthens the persistence patterns of particular student populations. A unique feature of the SI program at Long Beach is that students enroll for a one-unit prebaccalureate class to gain admission to SI sessions. In this way SI becomes a part of the student's weekly schedule and student participation is higher than programs where SI attendance is voluntary. Participants from various student groups were tracked for a period of 8 semesters beginning in Fall 91, and their performance and retention patterns were compared with those of control peer groups of nonparticipants. SI was found to have essentially an immediate impact (grade range: 4.0 to 0.0; target course: 2.86 vs. 2.27 and semester GPA: 2.77 vs. 2.49) on traditional students; however, it has a substantial impact on both performance [2.52 vs. 1.82] and retention [70% vs. 51%] for special-admit students and a definite benefit for underrepresented/underprepared students. Low motivated students, as evidenced by

their prior college performance, maintained consistent improvement after SI participation.

Reittinger, D. L., & Palmer, T. M. (1996). Lessons learned from using Supplemental Instruction: Adapting instructional models for practical application. Research and Teaching in Developmental Education, 13 (1), 57-68
This article describes the use of Supplemental Instruction to increase student academic achievement. A research study suggests that SI contributed to higher mean final course grades in an introductory psychology course (Psychology 110) over five semesters in seven sections. Several lessons learned included: SI provides professional development opportunities for the SI leader; SI attend may be negatively affected if the SI leader quits attending the class lecture sessions; students will not attend SI if the scheduled times are inconvenient; and requiring students to attend 90 percent of the SI sessions to receive extra academic credit from the course instructor results in less than ten percent of the students choosing to attend at that level.

Rye, P. D., & Wallace, J. (1994, March). Helping students to learn: Supplemental Instruction. Student British Medical Journal, 2, 79-80 Available: http://www.umkc.edu/cad/si/sidocs/ prhelp94.htm
This short article provides an overview of Supplemental Instruction and its use with medical students.

Rye, P. D., & Wallace, J. (1994). Supplemental Instruction: A peer-group learning program for medical undergraduates. Nordisk Medicin, 109(11), 307
This article describes the use of Supplemental Instruction (SI) with Norwegian undergraduate medical students. Various benefits of SI are described for the session participants: study strategies, life-long learning skills, and working in learning teams with other students.

Rye, P. D., Wallace, J., & Bidgood, P. (1993). Instructions in learning skills: An integrated approach. Medical Education, 27 (6), 470-473 Available: http://www.umkc.edu/cad/si/sidocs/prlnsk93.htm
The transition from school to university education and a medical school environment can be difficult for even the very best students. The article suggests that Supplemental Instruction (SI) would be useful to improvement academic performance of these students. Research studies from Kingston University (Surrey, England) in Computer Science, Electronics and Engineering are cited to suggest the Supplemental Instruction would also be helpful for medical students (62.3 percentile vs. 54.2 percentile for non-SI participants).

Saunders, D. (1992). Peer tutoring in higher education. Studies in Higher Education, 17(2), 211-218
This article describes the development of peer tutoring programs at many institutions in the United Kingdom. Supplemental Instruction (SI) is one of the programs that is being

implemented in higher education institutions. Lecturers are being asked to experiment with a greater variety of teaching and learning strategies which complement the lecture tradition. The use of SI at Kingston Polytechnic is mentioned. The benefits of tutoring programs for the tutors are described.

Saunders, D., & Gibbon, M. (1998). Peer tutoring and peer-assisted student support: Five models within a new university. Mentoring and Tutoring, 5(3), 3-13
This article describes the use of Supplemental Instruction (SI) -- called Peer Assisted Student Support (PASS) by the local institution -- in the Business School at the University of Glamorgan in Glamorgan, Wales, United Kingdom. SI has been offered in the School of Applied Sciences since 1991. It is called PASS within the Business School. Most of the PASS group facilitators are volunteers and have previously been participants in groups when they were first year students. Positive reports from facilitators included: satisfaction gained from being able to positively help their peers, improved self-confidence, better communication and oral presentation skills as a result of running sessions, and being able to strengthen their job resume. The author identified several challenges with the PASS scheme: student attendance was erratic due to perceived time conflicts of students; difficulty to maintain the voluntary program as committed PASS facilitators graduated and new leaders needed to be recruited to take over responsibilities.

Sawyer, S. J., Sylvestre, P. B., Girard, R. A., & Snow, M. H. (1996). Effects of Supplemental Instruction on mean test scores and failure rates in medical school courses. Academic Medicine: Journal of the Association of American Medical Colleges, 71(12), 1357-1359. Correspondence and requests for reprints should be addressed to Dr. Snow, University of Wisconsin Medical School, Dean's Office, 1142 Medical Sciences Center, 1300 University Avenue, Madison, WI 53706-1532.
The purpose of the research study was to determine whether Supplemental Instruction (SI) offered to first-year medical students reduces the number of examination failures. The SI program -- locally called the Medical Scholars Program (MSP) -- was offered at not cost to all first-year students at the University of Southern California School of Medicine in 1994-95. SI sessions were offered in biochemistry, gross anatomy, microanatomy, and physiology. Mean test scores and failure rates for students considered academically at risk and those not at risk were compared between the class entering in 1994 and the classes matriculating during the preceding three years. Since 85% of students elected to participate in the SI program, it was necessary to compare performance to previous academic terms rather than the non-SI group which was so small as to make same academic term comparisons difficult. At-risk students were defined as those with a total Medical College Admission Test score below 26 and a science grade-point average below 3.0. Comparisons were performed using two-tailed t-tests and chi-square tests. Statistically significant increases in mean test scores were achieved on most examinations by the class exposed to SI. Failure rates for at-risk students decreased by 46% during the year the SI program was offered. The authors

listed other outcomes from the SI program: strengthened study strategies that could be used in other courses; students identified gaps in his or her knowledge in advance of examinations; enhanced cooperative rather than competitive interaction with colleagues; hastened development of class camaraderie by broadening the student's circle of friends since they were randomly assigned to the SI groups; and increased student morale and self-esteem since the students experienced less academic failure. SI leaders reported the following benefits of the SI program for themselves: reviewed first-year material in the SI courses which helped them prepare for both the second-year courses and for Step 1 of the United States Medical Licensing Examination.

Schaefer, S., & Hopper, J. (1991). Successful funding and implementation of a biology adjunct. Journal of College Reading and Learning, 24(1), 55-62
This article describes the use of Supplemental Instruction (SI) in an introductory course in biology -- BIO 90, Diversity of Life -- at the University of California, Irvine. SI is offered as a non-credit class that accompanies a specific course. The authors describe the process for gaining support to provide the program: contact with counselors, administrators, and faculty; identified the historically difficult course that needed assistance; wrote a grant proposal; and conducted a pilot test of SI with a limited number of students. Results of the program included: positive relationship between attendance in SI and final course grade; statistically significant positive change ($p < .01$) from pre- to post-test performance on the Nelson Denny Reading Comprehension Subtest; post-tests in writing showed that students were more likely to answer essay questions with correct answers in complete sentences; and for all the items on the self-assessment of reading, writing, and thinking skills there was a positive, and statistically significant change.

Schwartz, E. B. (1997, December). Program helps students make the grade. Key Magazine,
This short article provides an overview of the Supplemental Instruction (SI) program. The author is the Chancellor the University of Missouri-Kansas City, home of the SI program.

Schwartz, M. D. (1992). Study sessions and higher grades: Questioning the causal link. College Student Journal, 26(3), 292-299
This article contains a data study of the use of Supplemental Instruction (SI) in a large sociology course at Ohio University (Athens, OH). While the study did not reveal statistical significance between SI attendance and final course grade, the students who attended the SI sessions tended to have fewer unexcused absences in the course. In turn, a higher number of unexcused absences was associated with lower course grades.

Shaya, S. B., Petty, H. R., & Petty, L. I. (1993). A case study of Supplemental Instruction in biology focused on at-risk students. BioScience, 43(10), 709-711
The effects of Supplemental Instruction (SI) in Basic Biology I course at Wayne State University (MI) is examined by studying the academic performance of academically at-risk students (low high school grade-point average, low ACT standardized test scores).

The SI sessions were open to all students in the course. About 25 percent of the traditional admit students and 40 percent of the at-risk students voluntarily participated in SI sessions during the academic term. The data suggests that SI contributed to higher mean final course grades for SI participants (2.9) vs. nonparticipants (2.4). A separate analysis was conducted to compare the academic performance of at-risk students. At-risk SI participants received higher mean final course grades (2.65 vs. 1.31) and had a higher course completion rate (90 percent vs. 32 percent). To attempt to control for student motivation level, an analysis was conducted of high school grade point averages and ACT scores for SI and non-SI participants among the at-risk students. No significant differences were found. A second analysis for student motivation considered intrasemester SI entry. At-risk students who began to attend SI later in the academic term earned higher mean final course grades than at-risk students who chose not to attend SI. The data suggests that SI participation contributed to the majority of the variance concerning higher mean final course grades.

Simpson, M. L., Hynd, C. R., Nist, S. L., & Burrell, K. I. (1997). College academic assistance programs and practices. Educational Psychology Review, 9(1), 39-87. Correspondence should be directed to Michelle L. Simpson, Division of Academic Assistance, University of Georgia, Athens, GA 30602.
This comprehensive article provides an overview to academic assistance for college level learning tasks. After examining four critical issues confronting all academic assistance programs (Should generic or content-specific skills be taught? How can transfer be promoted? What is the role of task and context? What is the role of motivation in self-regulated learning?), the authors examined the goals, assessment procedures, salient features, and program evaluation methods of four prevalent program models: learning to learn course, Supplemental Instruction (SI), required programs for underprepared students, and integrated reading/writing courses. After providing an overview of the SI model, the authors point out that embedded strategy instruction (modeling of study strategies) is a major feature that distinguishes it from many other systems since they employ a direct instructional procedure to teach study skills. The authors concluded by outlining suggestions for future research (e.g., include both descriptive and experimental paradigms, investigate long-term effects, collect both product and process data, seek linkages across disciplines) and by listing specific questions that college students need to ask about the programs at their institutions.

Sommerfeld, M. (1995). Who's responsible? Taking sides on remedial classes. Education Week, 14(29), 1, 14
This article discusses alternatives to traditional remedial and developmental education programs. Included in the article is a short interview with David Arendale concerning the use of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI). One of the difficulties for first-time students is that they concentrate on the wrong things as they prepare for their first examinations.

Staff writer. (1996). Georgia's HOPE: A system in transition. Black Issues in Higher Education, 13(15), 10-13, 16
This article describes Georgia's HOPE (Helping Outstanding Pupils Educationally) program to improve academic success of its college students. Dr. Stephen Portch serves as Chancellor of the University of Georgia System and Atty. Juanita Baranco is Regent with the University of Georgia System. Both are interviewed in this article. Portch suggests that Supplemental Instruction (SI), with its focus on at-risk courses rather than at-risk students, allows student to earn higher grades without labeling them in the process or continuing the previous system of remedial education that retaught material from high school.

Staff writer. (1997). Supplemental Instruction and minority students. Journal of Developmental Education, 20(3), 38
This article describes a national research study of Supplemental Instruction (SI) with students of color. Students of color participated in SI at rates equal or exceeding those for White students (White, 33.3%; African-American, 42.0%; Hispanic-American, 50.9%; Asian-American, 33.3%; and Native-American, 42.9%). Students of color who participated in SI earned higher mean final course grades (2.02 vs. 1.55) and lower rates of D, F and withdrawal rates (36% vs. 43%) than similar students who did not.

Stephens, J. E. (1995). Supplemental Instruction in developmental mathematics: Inquiring minds want to know. Journal of Developmental Education, 19(2), 38
Based on the author's dissertation research concerning Supplemental Instruction (SI), the following observations concerning SI in math were made: (1) the developmental math student participants in SI in relationship to their perceived level of difficulty of the course instructor; (2) SI program success is dependent upon the level that students are active in SI sessions; (3) when the variable of repetition is applied to SI and non-SI participant, higher academic success is associated with first-time course students; (4) when the variable of gender is applied to SI and non-SI participant when there has been a high level of vocalization during SI sessions, females tend to increase more highly in academic terms than males; (5) when the variable of gender is applied to SI and non-SI participant when there has been a low level of vocalization during SI sessions, academic achievement will be fairly equal among the genders.

Timmermans, S. R., & Heerspink, J. B. (1996). Intensive developmental instruction in a pre-college summer program. The Learning Assistance Review: The Journal of the Midwest College Learning Center Association, 1(2), 32-44
This article describes a modification of the Supplemental Instruction (SI) model at Calvin College (Grand Rapids, MI) to take into account the cognitive and developmental factors of high school students. This instructional component was placed in a pre-college summer program called Intensive Developmental Instruction (IDI). Unique features of IDI include: high school students are placed in college-level classes beyond their current level of academic ability; the SI leader is a certified K-12 teacher from

outside the course area who takes the class along with the high school students; and explicit instruction is provided by the IDI leader in learning strategies. A comparison was made between the IDI high school students and the college students in the same classes who did not participate in IDI. It was assumed that the college students were stronger academically than the high school students since their mean ACT score was higher (24 vs. 20 for IDI students). IDI students received a grade of C or higher 88.7 percent of time compared with 80.6 percent for the college students. Results from the Learning and Study Strategies Inventory suggest that their involvement in IDI improved their use of learning strategies.

Topping, K. J. (1996). The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. Higher Education, 32(3), 321-345
The increasing use of peer tutoring in British higher education necessitates a clear definition and typology. Through an extensive review of the literature, the author discusses peer tutoring in general with a short review of and the Supplemental Instruction (SI) program. Research studies from both the U.S. and U.K. suggest that participation in SI is positively correlated with higher mean final course grades. Other UK studies suggested improved communication skills and deeper understanding of the curriculum occurred for SI participants and higher grades for the SI leaders themselves.

Van Lanen, R. J., & Lockie, N. M. (1997). Using Supplemental Instruction to assist nursing student in chemistry: A mentoring program's support network protects high-risk students at Saint Xavier University. Journal of College Science Teaching, 26(6), 419-423
This article discusses the use of Supplemental Instruction (SI) with nursing students in Principles of Organic and Biochemistry (Chemistry 108) at Saint Xavier University (IL). Chemistry 108 is the second class in a two-semester introductory chemistry course designed for freshman nursing students. After a basic overview of the SI model, the article discusses a research study to examine the effectiveness of the SI program. The Chemistry 108 class was composed mainly of women (94.5%), transfer students (75.8%), and nursing majors (95.1%). It was equally distributed between students above and below age 23. In this study SI participants were defined as students who attended six or more times. The SI group received a higher mean final course grade (2.52 vs. 2.21) and a lower rate of D, F and course withdrawals (14.3% vs. 29.1%). The authors postulate that due to the variety and complexity of skills needed to understand chemistry -- complex content mastery, language, and problem solving -- higher levels of SI attendance are needed to show more consistent positive academic results. Three themes emerged from SI participants concerning why they felt SI was helpful: (1) working out problems on the black board; (2) opportunity to share information; and (3) chance to help each other.

Visor, J. N., Johnson, J. J., & Cole, L. N. (1992). The relationship of Supplemental Instruction to affect. Journal of Developmental Education, 16(2), 12-14, 16-18
Available: http://www.umkc.edu/cad/si/sidocs/jvaffc92.htm

This Supplemental Instruction study that examined college students enrolled in an introductory psychology course conducted at Illinois State University (Normal, IL) addressed the following questions: a) Are students who elect to participate in SI affectively different from those who choose not to do so? b) does SI affect a positive change in noncognitive factors for participants? The noncognitive factors examined were locus of control, self-efficacy, and self-esteem. Results suggested that those who participated regularly in SI were affectively different from those who participated only occasionally or not at all. SI participants tended to have a higher internal locus of control and higher self-esteem than others. The researchers suggested that this may have been due to the manner in which the SI program was promoted to students. Self-efficacy actually decreased for the more frequent SI participants. The researchers suggested that these students may have developed a more accurate understanding of their strengths and weaknesses while the others were "blissfully ignorant of what it takes to succeed." Increased sensitivity by the SI leader may be needed to effectively meet the needs of "at-risk" students (external locus of control, low self-efficacy, and low self-esteem). The authors suggest additional research is needed regarding non-cognitive variables.

Wallace, J. (1992). Students helping students to learn. The New Academic, 1(2), 8-9 Available: http://www.umkc.edu/cad/si/sidocs/jwhelp92.htm
This article describes the use of Supplemental Instruction (SI) at Kingston University in London, England. In addition to reports of improved academic performance by SI participants, interviews with SI leaders suggest they had the following results: higher final course grades in other subjects, increased leadership skills, higher confidence levels, and increased contact with faculty members.

Wallace, J. (1995). Supplemental Instruction: Students helping each other with their learning. UCoSDA Briefing Papers, 20, 1-4. Available: UCoSDA, Level Six, University House, Sheffield, England S10 2TN.
This paper provides an overview of the Supplemental Instruction (SI) model as it is implemented in the United Kingdom. In addition to the traditional purposes of the SI program, there are two additional emphasis areas for the SI program. First, SI leaders are expected to feed back to the course professor students comments (e.g., relevance of instructional pace, understanding of the lecture material, relevance of support materials such as handouts). SI leaders receive special training to delicately share this information with the faculty members. The second emphasis area is on staff and educational development. Faculty members are encouraged to make adjustments of their teaching behaviors to accommodate the needs of the students.

Warren, B. Z., & Tonsetic, R. (1997). Supporting large classes with Supplemental Instruction (SI). Journal of Staff, Program, and Organization Development, 15(2), 47-54
This paper discusses the use of Supplemental Instruction (SI) at the University of Central Florida (27,000 students) as one component in dealing with helping faculty and

students deal with large classes. In Spring 1997 39 classes had an enrollment of 200 or more students. During Fall 1996 SI was provided for four large class sections including a chemistry course for non-science majors. SI participants earned a higher mean final course grade (3.39 vs. 1.72). When adjusted for differences in SAT scores, the SI group still received higher grades (2.54 vs. 1.71). The percent of A and B final course grades was higher for the SI group (47% vs. 20%) as well as lower rates of D, F or course withdrawals (18% vs. 56%). Positive results were also reported for the SI in general biology and American national government. There were no significant differences in the calculus course. While there was high satisfaction with the SI participants, the grade differences were not significant. The authors suggest that the SI sessions in math need modification for more effective use.

Webster, T., & Dee, K. C. (1998). Supplemental Instruction integrated into an introductory engineering course. Journal of Engineering Education, 87(4), 377-383
This article describes the use of Supplemental Instruction (SI) during Fall 1996 in Introduction to Engineering Analysis at Rensselaer Polytechnic Institute (Troy, NY). The course is generally taken in the first semester of the freshman year and covers vector mechanics (statics), linear algebra, and computer-based matrix methods for solving engineering problems. Of the students in the class, 23 percent participated in SI sessions. Students who participated in SI earned higher mean final course grades (3.13 vs. 2.67, $p < .025$), higher rate of A & B final course grades (77% vs. 62%, $p < .01$) and received a lower rate of D, F or withdrawals (0% vs. 18%, $p < .01$). There was a positive correlation between higher levels of SI attendance and higher final course grades. All students who attended at least four SI sessions throughout the semester received a final course grade of A or B. A subpopulation of students who were designated as "at-risk" or "high risk" were studied. SI participants earned higher grades their counterparts who did not attend SI sessions (At-risk: 2.60 vs. 2.18; High-risk: 2.38 vs. 1.58; $p < .01$). The researchers reported that unfortunately half of these students did not participate in any SI sessions. Surveys of students suggested the following improvements for the SI program: hold more sessions during the academic term to help reduce SI session size (mean size = 13); hold SI sessions longer than one hour to provide sufficient time to deal with material; and consider more than one SI leader to allow smaller SI session size. SI leaders provided feedback to the course instructor concerning the comprehension level of students concerning the course material. Instructors used the feedback to modify future course lectures. SI leaders the following benefits of the SI program for themselves: deeper understanding of course material, excelled in other courses since they were reviewing basic concepts in the SI course, developed communication skills, improved teaching skills, and enhanced leadership skills.

Webster, T., & Hooper, L. (1998). Supplemental Instruction for introductory chemistry courses: A preliminary investigation. Journal of Chemical Education, 75(3), 328-331. Available: Thomas Webster, The Advising and Learning Assistance Center, Rensselaer Polytechnic Institute, Troy, NY 12180.

This article describes the use of Supplemental Instruction (SI) between Spring 1995 and Fall 1995 at the University of Pittsburgh (PA) for two semesters in General Chemistry I and for one semester in Organic Chemistry I. After a review of the literature concerning academic needs in science, the researchers describe the results of their study. The percentage of students that participated in SI ranged from 37 to 45 percent. Students uniformly rated the SI sessions very helpful (0 to 5 point scale: ranged from 4.1 to 4.5). The results uniformly favored the SI participants: Gen Chem S95: A&B grades, 39% vs. 30%; D,F&W, 10% vs. 34%; mean final grade, 2.34 vs. 1.95. Gen Chem F95: A&B grades, 43% vs. 33%; D,F&W, 15% vs. 31%; mean final grade, 2.46 vs. 2.19. Org Chem F95: A&B grades, 54% vs. 33%; D, F&W, 6% vs. 26%; mean final grade, 2.59 vs. 2.17. The researchers suggested that SI has helpful in chemistry since it helped in the following areas: mathematics, problem solving, conceptualization, theoretical, and familiarization with the chemical language.

White, B. (1996). The student peer mentor program in its trial year: A mentor's perspective. Queensland University of Technology Law Journal, 12(1), 221-228. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
In 1994 the Student Peer Mentor program was piloted in the Bachelor of Laws program of study (two individual classes: Torts and Law of Contract) at Queensland University of Technology in Australia. The program was based upon Supplemental Instruction (SI). This article describes the program from the perspective of one of the student mentors. Strengths of the program included: less private time needed to study; non-threatening environment; identified academic skills needed for success; and expanded social circles. Benefits of the program for the mentors included: improved interpersonal communication skills; increased content comprehension; provided personal satisfaction of helping others; and improved confidence in leadership and group situations.

Wilcox, F. K. (1999). Killer course survival: Supplemental Instruction. The College Parent Advisor, 3(1), 2-3
This article provides a general overview of the Supplemental Instruction (SI) model.

Wilcox, F. K., & Koehler, C. (1996). Supplemental Instruction: Critical thinking and academic assistance. Metropolitan Universities: An International Forum, 6(4), 87-99 Available: http://www.umkc.edu/cad/si/sidocs/kwcrit96.htm
This article provides a basic overview of the Supplemental Instruction (SI) including data from the University of Missouri-Kansas City. A UMKC study reviewed data from a geographically and institutionally diverse group of 146 institutions that used SI in 2,875 courses of diverse academic areas with an enrollment of 298,629 students. The data suggests that SI participants earned higher mean final course grades (2.30 vs. 1.85); higher percent of A and B final course grades (47.5% vs. 35.8%) and a lower rate of D, F and course withdrawals (23.7% vs. 38.0%). A 1989 study at UMKC found that SI participants reenrolled the following semester at a higher rate than non-SI participants

(90.0% vs. 81.5%). A study of SI and non-SI participants during their first academic term at UMKC in Fall 1983 found that by Fall 1989 the SI participants had graduated at a higher rate (30.6% vs. 18.2%). A comparison is made between the traditional paradigm of learning that is the current pedagogy of most classroom instructors and the new reflective learning paradigm. SI sessions help students to use both paradigms to maximize learning and academic achievement.

Wittig, G., North, S., & Thomerson, J. E. (1996). Supplemental Instruction improves student retention and performance in biology. Transactions, 89(65), 79
This article reports the use of Supplemental Instruction (SI) in a biology course at Southern Illinois University at Edwardsville. Success in Biology 120, which introduces into the majors core, is a strong predictor of academic survival. Because 50 percent of students earned D, E and withdrawal grades, SI was introduced. Undergraduate SI leaders were placed in both lectures and laboratories, and they offered weekly, out-of-class SI sessions. Of 171 Fall 1995 and 88 Spring 1996 students, 56 and 67 percent respectively participated in SI. Students attending from 4 up to 37 sessions per semester averaged a full grade point better course grades than non-SI students and hardly any (4 and 0 respectively) D, E, and withdrawal grades. Differences were significant at the 1 and 5 percent level respectively.

Wolfe, R. F. (1987, Spring). The Supplemental Instruction program: Developing learning and thinking skills across the curriculum. Issues in College Learning Centers, 5, 5-12
Available: http://www.umkc.edu/cad/si/sidocs/rwints89.htm
The author describes implementation of the Supplemental Instruction (SI) at Anne Arundel Community College in Arnold, Maryland. A Fall 1986 research study concerning the impact of the SI program with a History 211 course suggested that SI participation contributed to higher final course grades (2.5 vs. 1.6) and lower rates of D, F and withdrawal (16% vs. 55%) even though the SI participants had a lower mean SAT score (370 vs. 430). Another indication of the influence of the SI program was a shift of the overall rate of D, F and course withdrawals from 45 percent down to 33 percent for the History 211 course. Some professors at the college reported using the SI program for faculty development in the following ways: sometimes the course instructor incorporated SI leader developed materials initially used during SI sessions; used the SI leader as a feedback forum for evaluating the comprehension level of students of key concepts.

Wolfe, R. F. (1987). The Supplemental Instruction program: Developing learning and thinking skills. Journal of Reading, 31(3), 228-232
The author describes implementation of the Supplemental Instruction at Anne Arundel Community College in Arnold, Maryland. A Fall 1986 research study concerning the impact of the SI program with a History 211 course suggested that SI participation contributed to higher final course grades (2.5 vs. 1.6) and lower rates of D, F and withdrawal (16% vs. 55%) even though the SI participants had a lower mean SAT score.

SI participants self-reported high satisfaction with their experience in the SI program (4.5 on a 5 point scale). Some professors at the college reported using the SI program for faculty development in the following ways: sometimes the course instructor incorporated SI leader developed materials initially used during SI sessions; used the SI leader as a feedback forum for evaluating the comprehension level of students of key concepts.

Wolfe, R. F. (1987). Writing across the curriculum through Supplemental Instruction. Maryland English Journal, 21(2), 43-48
At Anne Arundel Community College (Arnold, MD), the Supplemental Instruction (SI) program is also used to improve students' writing skills. In SI sessions for a history class during Fall 1986 additional activities were directed to developing writing skills. Research suggests that SI participants demonstrated improved performance in written essay examinations. The activity had four steps: 1) overview all material from notes and text that could be used to answer the question; 2) organize the information; 3) develop a summary statement; and 4) develop an outline for the answer. SI participants earned a higher mean final course grade (2.5 vs. 1.6) and a lower rate of D, F and course withdrawals (16% vs. 55%).

Wolfe, R. F. (1988). A model retention program for the community college. Maryland Association for Higher Education Journal, 11, 18-20 Available: http://www.umkc.edu/cad/si/sidocs/rw2yr88.htm
This article describes the implementation of the Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD). In addition to a descriptive overview of the SI program, data from a 1987 research study suggests that SI participants received higher mean final course grades (2.6 vs. 1.9) and lower rates of D, F and withdrawals (24% vs. 44%). Using the same data set, when developmental education students and students of color were studied regarding the impact of SI attendance, the results were more pronounced than when examining the entire class of students. SI participants earned higher mean final course grades (3.1 vs. 1.8).

Wolfe, R. F. (1990). Professional development through peer interaction. The Journal of Professional Studies, 14(1), 50-57 Available: http://www.umkc.edu/cad/si/sidocs/rwment90.htm
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Mentors are placed in classes outside their own discipline. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness. Faculty mentor roles included: 1) attending a three-day pre-semester training seminar (e.g., examined learning strategies, examined their own teaching and

learning styles, learned questioning techniques, and practiced group management); 2) attending all classes and study sessions as a student in the target class for the first four weeks of the semester; 3) working with student leaders to prepare strategies for the study session; 4) working with student leaders to create supplemental materials such as graphic representation of abstract concepts; 5) formally evaluating student leaders during the second half of the semester, and 6) keeping a daily journal to record their observations and reflections about classes and SI sessions.

Section Four: Audio and Videotapes

Briere, P., Congos, D. H., & Wallace, J. (1995). Promoting the Supplemental Instruction program. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. This videotape discusses various aspects of promoting the Supplemental Instruction (SI) program. Discussion participants reviewed a variety of topics including recruiting SI leaders, promoting attendance among students, and gaining support from faculty and administrators. The panelists are campus SI supervisors as well as Certified Trainers with the SI program. Wallace is the Certified Trainer from the United Kingdom.

Briere, P., Garland, M., Visor, J. N., & Browning, S. (1995). The use of Supplemental Instruction with target populations. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.

This videotape records a panel discussion concerning the use of Supplemental Instruction (SI) with targeted subpopulations of students. Generally the SI program is provided for all students on campus. Due to specific needs and restricted funds, the SI program may be targeted with success for any of the following groups: students on academic probation; academically underprepared students; student-athletes; Upward Bound high school students; international students; and programs that limit grant funds to eligible populations (e.g., Carl Perkins Vocational, TRIO programs). The panelists discuss how to market to these student groups and conduct appropriate evaluation systems. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Browning, S., Minkoff, D., Wallace, J., & Zerger, S. (1995). The use of Supplemental Instruction for faculty and SI leader development. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.

This videotape records a panel discussion on the uses of Supplemental Instruction (SI)

for both faculty and SI leader professional development. Topics covered included: faculty development in the United Kingdom and the U.S.; SI leaders serving as partners with faculty members to improve classroom learning; using SI as an anonymous feedback mechanism for faculty members; and developing a faculty focus on increased student learning. The panelists are campus SI supervisors with the SI program. Wallace is Certified Trainer for the United Kingdom with Minkoff and Zerger trainers for the U.S.

Burmeister, S. L., McLaren, A., & Zerger, S. (1995). Supplemental Instruction in the content areas: English, Humanities, and Mathematics. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This videotape records a panel discussion on the subtle differences and needs for Supplemental Instruction in different content areas. Topics included: differences in problem-based and vocabulary-based curriculums; use of SI in laboratory situations; strategies for mastering vocabulary; relationships between lectures and textbooks in different content areas; and the degree to which strategies for curriculums overlap with each other. The panelists are all campus SI supervisors as well as Certified Trainers with the SI program.

Congos, D. H., McLaren, A., & Visor, J. N. (1995). Clinical supervision of Supplemental Instruction sessions. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape records a discussion by a panel regarding various issues related to supervision of the Supplemental Instruction program: role of the Assistant SI Supervisor; components of a clinical supervision protocol; the limit of capacity for supervision; mentoring and evaluation in clinical supervisory debriefing sessions; and protocol for debriefing SI sessions. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Garland, M., & Anderson, J. (1985). Supplemental Instruction: The review session. [Videotape]. M. Garland (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape provides a simulation of an Supplemental Instruction (SI) session in an economics class. A narrator guides the viewer regarding the activities of the SI leader and provides a debriefing of the SI session.

Garland, M., & Gordy, K. (1989, May 11). National teleconference on Supplemental Instruction. [Videotape]. J. Connett, & Confer B J (Producers) Kansas City, MO: United States Department of Education, National Diffusion Network. Available: Center for

Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This live national teleconference featured an overview of the Supplemental Instruction (SI) model. Also included were interviews with SI leaders and faculty members who had SI attached to their classes. A live call-in portion of the teleconference permitted members of a national audience to call in with questions.

Garland, M., & Jamerson, L. (1988). Supplemental Instruction: A validated model of student academic support [Audio cassette]. Glendale, CA: Mobiltape Co. Available: Interlibrary loan from the Community College of Vermont.
Taped at the 1988 National Conference on Higher Education in Washington, D.C., two experts from the Supplemental Instruction (SI) program at the University of Missouri-Kansas City discuss their experience with SI, a nonremedial model of student academic assistance that targets historically-difficult courses rather than high-risk students. They provide an overview of the model and its use with a variety of student subpopulations.

Garland, M., Minkoff, D., & Zerger, S. (1995). The use of Supplemental Instruction in small classes and small colleges. [Videotape]. D. Arendale (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape records a panel discussion regarding the advantages and challenges of Supplemental Instruction (SI) in small classes and colleges. Some of the issues included: locating SI leaders; cost effectiveness in small classes; networking with faculty members; and the use of SI in quarter and semester terms. The panelists are campus SI supervisors as well as Certified Trainers with the SI program.

Kenney, P. A. (1988). Supplemental Instruction sessions in math courses. [Videotape]. M. Garland (Producer) Kansas City, MO: University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This video tape features Dr. Patricia Kenney discussing ways in which Supplemental Instruction (SI) in mathematics courses differ from those in other content areas. Kenney served as a math SI leader during her doctoral research on the effectiveness of SI in math sessions at the University of Texas at Austin.

Martin, D. C. (1994). Video-based Supplemental Instruction panel discussion. [Videotape]. K. Blair (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape panel discussion provides an overview of the Video-based Supplemental Instruction (VSI) program. Moderated by the creator of SI and VSI, Deanna Martin, the panel was composed of an administrator, faculty member who placed his course on video, former VSI student, and academic advisor who places students in VSI.

Miner, J. (1991, October 16). Politics of remediation. [Videotape]. Los Angeles, CA: DeAnza College. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. This video teleconference was concerned with a review of successful practices for serving academically underprepared students. Featured panelists included John Roueche and Lee Noel. An eight minute segment featured an interview with Deanna Martin, creator of the Supplemental Instruction (SI) model. Martin provided an overview of the SI program and discussed how the program can be used to serve both the best and least prepared students.

Overly, C. (1995). Supplemental Instruction overview. [Videotape]. University of Western Michigan (Kalamazoo, MI): The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This ten minute videotape provides an overview of the Supplemental Instruction (SI) program. It includes brief interviews with SI leaders, SI supervisors and faculty members.

University of Missouri-Kansas City. (1999). Supplemental Instruction: Empowering student learning. [Videotape]. K. Patterson, & K. Wilcox (Producers) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape provides an overview of Supplemental Instruction (SI) through short interviews with SI leaders, SI participants, campus administrators, and Deanna Martin, creator of the SI model.

Wallace, J. (1996). Supplemental Instruction: A profile of the scheme. [Videotape]. G. Mair (Producer) Glasgow, Scotland: Glasgow Caledonia University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape provides an overview of the implementation of Supplemental Instruction (SI) in the United Kingdom. Jenni Wallace, Certified Trainer for the United Kingdom, provides a historic perspective of SI's use in the United Kingdom. Following is an interview with two SI leaders (Paul Irwin and Mel Dobie) concerning benefits of the SI program to the SI leaders: increased leadership skills, improved use of study strategies, higher confidence level, and increased content knowledge.

Wallace, J. (1996). Supplemental Instruction: The challenging way forward. [Videotape]. G. Mair (Producer) Glasgow, Scotland: Glasgow Caledonia University. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape provides an overview of the implementation of Supplemental Instruction (SI) in the United Kingdom. It contains an interview with two SI leaders (Paul Irwin

and Mel Dobie) concerning benefits of the SI program to the SI leaders: increased leadership skills, improved use of study strategies, higher confidence level, and increased content knowledge.

Wilcox, F. K. (1992, February 17). Supplemental Instruction: Interview with Deanna Martin and Robert Blanc. [Videotape]. J. Connett (Producer) Kansas City, MO: National Diffusion Network, United States Department of Education. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape interview provides a historic overview of the Supplemental Instruction (SI) program. The creator of the SI program -- Deanna Martin -- and her husband Robert Blanc who customized the use of SI with medical students are interviewed in this program. Topics included: overview of the SI program; historical background of SI; typical activities in SI sessions; training of SI leaders; and suggested methods of evaluating the SI program.

Wilcox, F. K. (1993). Supplemental Instruction: Improving academic success in historically-difficult courses [Audio cassette]. Iowa City, IA: National Center for Student Retention. Available: Interlibrary loan from Valencia Community College in Florida.
Taped at the 1993 National Conference on Higher Education in New Orleans, LA, Dr. Kim Wilcox from UMKC discusses his experience with Supplemental Instruction (SI), a nonremedial model of student academic assistance that targets historically-difficult courses rather than high-risk students.

Wilcox, F. K. (1996). Supplemental Instruction session demonstration. [Videotape]. F. K. Wilcox (Producer) Kansas City, MO: The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This videotape provides a simulation of a Supplemental Instruction (SI) session in an introductory Physical Science course. Students who are participating in SI during the current academic term simulate a SI session for a recent class lecture. Common SI session activities are illustrated: vocabulary development, identification of main ideas, connecting ideas, creating visual matrixes, lecture note review, and test question prediction. SI participants and the SI leader for the course share benefits of SI participation. The moderator then provides a debrief of the SI session.

Section Five: Newsletter Articles

Allen, M., Kolpas, S., & Stathis, P. (1992, October). Supplemental Instruction in calculus at a community college. Collaborative Learning Exchange Newsletter, 8-9 Available: http://www.umkc.edu/cad/si/sidocs/maclc92.htm

At Glendale Community College (Glendale, CA) an experiment was conducted in several calculus courses regarding optional and mandatory attendance. In the traditional SI model attendance in SI is optional and anonymous. In the classes where mandatory attendance was required, students received a 10 percent boost in their grade for participating and submitting additional homework assignments. SI participants earned a mean final course grade that was 20 percentage points higher (70 percentile vs. 50 percentile). In another experiment SI session strategies were integrated into the class sessions. The class instructor developed the work sheets used in the SI sessions. The students in the modified course were compared to classes where SI sessions were not integrated into them. The SI participants earned a mean final course grade nearly a full-letter grade higher than the other students. While initial comments from SI participants were negative, by the end of the term the comments were highly supportive of the SI program.

Arendale, D. (1996). Lessons that I have learned from students in peer study groups. National Association for Developmental Education Newsletter, 20(1), 1-3 Available: http://www.umkc.edu/cad/si/sidocs/daless96.htm
Based on comments from Supplemental Instruction leaders and participants, this newsletter article describes six lessons learned by the author in his role as a course lecturer: 1) student-led discussions are needed to make lectures and reading assignments more valuable to students; 2) sometimes the lecturer spends too much time telling and not enough time modeling the thinking process for finding the answers and developing critical thinking abilities; 3) the lecturer needs to be careful not to by accident intimidate students; 4) only through student discussions will many be able to construct and retain the knowledge from the class; 5) the lecturer needs to frequently seek student feedback to improve my classroom instruction; and 6) there is more to learn at college than what happens in class.

Congos, D. H. (1993, Fall). A model for Supplemental Instruction in Introductory Chemistry. Supplemental Instruction Update, 1, 3 Available: http://www.umkc.edu/cad/si/sidocs/ nlchem196.htm
This article describes the use of Supplemental Instruction (SI) at The University of North Carolina at Charlotte in Introductory Chemistry courses. Four suggestions are made for problem solving activities: 1) SI leader models problem solving steps; 2) SI participants verbalize and write down the steps to solve the problem and how they arrived at their answers; 3) students ask each other questions during the problem solving process; 4) rules for solving the problem are written on the black board; 5) students work by themselves to solve similar problems; 6) students work on recognizing problem types; 7) SI leaders facilitate the discussion process of the students; 8) each step in the problem solving process is identified and numbered; and 9) students continue to practice on problems till they master the process.

Craig-Claar, D. (1994, Summer). Starting Supplemental Instruction at Maple Woods Community College. Supplemental Instruction Update, 1-2
The author is the Associate Dean of Instruction at Maple Woods Community College (MO). She describes the development of the Supplemental Instruction program at her campus. The article describes the administrative steps that were taken to initiate the program. A creative solution to compensate the SI leaders was that they were paid with fee waivers rather than the more common monthly paycheck.

Doyle, T. (1999, Winter). Ferris State University's structured learning assistance program. Michigan Developmental Educational Consortium Newsletter, 4-5,8. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This newsletter article describes a modification of the Supplemental Instruction (SI) model at Ferris State University. The Structured Learning Assistance Program (SLA) is based on SI and provides both an academic and an affective support system. SLA targets both high-risk for failure gateway and historically difficult upper division courses with four-hour per-week directed practice workshops. The SLA workshops are formally scheduled in the student schedule just like an accompanying science lab. Attendance at the workshop is required of all students the first week of the course or until the first test, quiz or other assessment is given in the class. Following the assessment, attendance is required only for students whose course grade point average falls below a 2.0 Other students may voluntarily continue to attend the SLA sessions. In addition to traditional SI program features, class professors receive regular, ongoing information about student progress, student concerns, and ways of better connecting with students. SLA sessions provide more explicit instruction in learning strategies. Research studies suggest that SLA students earn higher final course grades than nonparticipants in control groups.

Edelnant, V. (1999). Supplemental Instruction program helps students succeed. Recruitment and Retention in Higher Education, 13(5), 3
This short article describes the use of Supplemental Instruction (SI) at Wartburg College in Waverly, IA. The SI program is four years old at the 1,500 student undergraduate Wartburg College. Benefits for the SI leaders reported by the author include developing empathy for the faculty members, experimenting with a possible career as a teacher, and development of their leadership skills.

Gravina, M. (1991). Supplemental Instruction: SI for "at-risk" courses. Freshman Year Experience Newsletter, 3(4), 8
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Green, D. (1990). Student mentors fight departmental attrition. Academic Leader: The Newsletter for Academic Deans and Department Chairs, 6(3), 2
This newsletter article provides an overview of the Supplemental Instruction (SI) program. In addition to comments from SI's creator, Deanna Martin, it also provides a

quotation from Professor Lowell Orr at Kent State University who is using SI in his two biology courses. Orr supports the SI program since the SI leaders help participants to develop their own problem-solving skills.

Hester, B. (1992). Course teaches new skills with video. Arctic College Dialogue Newsletter, 6(2), 11
This newsletter article provides an overview of the use of Video-based Supplemental Instruction (VSI) at Arctic College, Iqaluit, Northwest Territories.

Hill, D. (1992, October). Supplemental Instruction in the social sciences at Weber State University in Ogden, UT. Collaborative Learning Exchange Newsletter, 10-11
Available: http://www.umkc.edu/cad/si/sidocs/dhwsu92.htm
The author reports on the implementation of Supplemental Instruction at Weber State University in Ogden, Utah. In the 1991-92 year SI was offered in US History 170, American National Government 110, Introduction to Criminal Justice 106, Introduction to Philosophy 101, and Introduction to Economics 101. In the Introduction to Criminal Justice 106 course the SI participants earned a higher percent of A and B final course grades (80% vs. 53%). The article described some of the SI session activities for the social science courses: cause and effect; comparison and contrast; short writing activities; review of elements of research reports; review lecture note taking strategies; integration of outside reading assignments with lecture notes; and interpretations of reading assignments.

Hostetter, S. (1994, Summer). Improving college student retention: Interview with David Arendale. National Tutoring Association Newsletter, (3), 2-3
The interview of David Arendale provided an overview of the Supplemental Instruction (SI) program. Tinto's Model of Student Retention was discussed and its relationship to explaining the effectiveness of the SI model was discussed. Data from a study of students at the University of Missouri-Kansas City suggested that SI participation with positively correlated with increased levels of reenrollment at the institution when compared with non-SI participants. It is estimated that through increased reenrollment rates, the SI program generates over $200,000 in annual savings.

King, P. (1992, Winter). Kingston University: A British supervisor's Supplemental Instruction experience. Supplemental Instruction Update, 1, 3
This newsletter article describes the use of Supplemental Instruction (SI) at Kingston University in London, UK. The author describes the use of the Assistant SI supervisor to help supervise an expanding SI program. The need for all SI leaders to attend frequent update training sessions is urged with the entire group meeting at the beginning of the meeting and then breaking into smaller groups based on academic disciplines for the remainder of the time.

Koehler, C. (1995, Spring). Supplemental Instruction and critical thinking. Supplemental Instruction Update, 1, 3 Available: http://www.umkc.edu/cad/si/sidocs/nlcrt196.htm

This article by an assistant professor of Communication Studies at the University of Missouri-Kansas City describes the utility of Supplemental Instruction (SI) for developing the critical thinking skills of SI participants. SI sessions involve a natural environment for inquiry by a community of learners. The SI leader helps participants to develop independent thinking. As students become engaged and active participants in the intellectual discourse that occurs during SI session, students move to higher levels of thought.

Levitz, R. (1990). Supplemental Instruction takes off. Recruitment and Retention in Higher Education Newsletter, 4(11), 7
This newsletter article provides a short overview of the Supplemental Instruction (SI) program. George Russell, chancellor at UMKC was quoted, "The SI approach avoids both the remedial stigma of typical assistance programs and the high costs of one-on-one tutoring.".

Lockie, N. M., & Van Lanen, R. J. (1992, January). Supplemental Instruction in Chemistry: A collaborative relationship among students, faculty, and a peer facilitator. Illinois Association for Personalized Programs Newsletter, 1, 3-4
This newsletter article describes the use of Supplemental Instruction (SI) at Saint Xavier College (Chicago, IL) in chemistry courses. Data from a 1990-91 study with a Chemistry 108 course suggests that SI participants earn higher mean final course grades and receive lower rates of D, F and withdrawals (15.4% vs. 37.1%) than non-SI participants.

Matthews, S., Liparato, S., Shah, P., Smigell, E., Smith, T., & Schmidt, T. (1993, Summer). Supplemental Instruction and biology. Supplemental Instruction Update, 1, 3 Available: http://www.umkc.edu/cad/si/sidocs/nlbio196.htm
The article describes the use of Supplemental Instruction (SI) in biology at Wayne State University (Detroit, MI). The authors selected biology for several reasons: large lecture sections; lecture-focused course; fast-moving lectures; problem-solving approach; focus on interrelatedness of content material; and relationships between of ideas and concepts. Common SI session activities included: finding connections between classroom lectures and textbook; developing charts and graphs to organize and visualize information and demonstrate relationships; moving away from just memorizing content to deeper discussions of meaning and relationships.

O'Flaherty, K., & Siera, M. (1985). The use of Supplemental Instruction in an Introduction to Sociology course. ASA Teaching Newsletter, 10(6), 13-16 Available: http://www.umkc.edu/ cad/si/sidocs/kosoci85.htm
At Wichita State University (KS) the Supplemental Instruction (SI) model was used to help improve student academic performance in an Introduction to Sociology course. This Spring 1984 study suggested that SI attendance was positively correlated with higher mean final course grades. Of the SI participants, 75 percent received a final course grade of A or B while 59 percent of non-SI participants received a similar grade.

Ogilvie, C. (1991, April). Supplemental Instruction: The California State University model. Illinois Association for Personalized Learning Programs Newsletter, 4-5
This newsletter article provides an overview of the Supplemental Instruction (SI) program at California State University. To increase attendance at the SI sessions, students are required to register for a section of one credit and pay tuition to allow attendance at the SI sessions. SI is provided to 35 sections of courses.

Payton, J., & Overly, C. (1994, Summer). Supplemental Instruction and Physical Geology. Supplemental Instruction Update, 1, 3
Available:http://www.umkc.edu/cad/si/sidocs/nlgeo196.htm
This article provides an overview of the use of Supplemental Instruction (SI) in a Physical Geology course at Western Michigan University. This course has served as a "gatekeeper" course for students who are considering geology as a major. Frequently cited SI session activities included: vocabulary development/review; ask group to assist with generating SI session agenda; create a visual matrix to help organize information; frequently use the "informal quiz" to check for comprehension level of SI participants; and create opportunities for students to connect lecture material to SI participants' lives.

Ramming, V. (1989, Fall). Supplemental Instruction: A proactive frontloading model. New Jersey Association of Developmental Educators Newsletter, 1
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Reeve, A. (1989, August). Different approach to tutoring: Supplemental Instruction. Aspirations: Association of Special Programs in Region Eight Newsletter, 2, 1
This newsletter article provides an overview of the Supplemental Instruction (SI) program with advantages of the SI model in comparison with traditional tutoring.

Staff writer. (1993, November). Academic programme at Queensland University of Technology well supported. The Chinese Business and Professional Association of Queensland Newsletter, 20-21
This newsletter article describes the use of Peer Assisted Study Strategies (PASS) at Queensland University of Technology (Brisbane, Queensland, Australia). PASS is the local institutional name for Supplemental Instruction (SI). The article cites the PASS program as one of the projects that contributed to QUT being selected as Australia's University of the Year in 1993. Benefits reported for PASS participants include reduction of the failure rate and increased student motivation and confidence. PASS leaders listed the following benefits for them: developed personal character and leadership skills, improving their own learning skills, improved their facilitating techniques, acquired group management and presentation skills, and built their self-confidence and self-esteem. Ron Gardiner and Henry Loh are cited as the early leaders of the PASS project.

Staff writer. (1994, Fall). Supplemental Instruction. South Carolina Association of Developmental Educators Newsletter, 3

The newsletter article provides an overview of the Supplemental Instruction (SI) program.

Staff writer. (1987). Redefining an attrition risk. Recruitment and Retention in Higher Education Newsletter, 1(3), 6-7

This newsletter article provides an overview of the Supplemental Instruction (SI) program. It contains interviews with Deanna Martin, creator of the SI program, and May Garland who directs SI training workshops. Garland suggests that SI can help bridge students from developmental education into the regular courses in the curriculum.

Staff writer. (1989). New Mexico program targets at-risk classes. National On-Campus Report, 17(2), 3

The newsletter article provides an overview of the Supplemental Instruction (SI) program as it is being implemented at the University of New Mexico in introductory chemistry and biology classes during 1988. Data suggests a half a letter grade higher final course grades for SI participants.

Staff writer. (1995). Supplemental Instruction equals science success. Recruitment and Retention in Higher Education Newsletter, 9(8), 9

This newsletter article describes the use of Supplemental Instruction (SI) at the University of Wisconsin. The researchers from UW studied why the teaching of science discouraged women from pursuing academic degrees in the area. SI was cited as a supportive learning environment that was different than the one experienced in the classroom. Several suggestions for faculty members: build a comfortable classroom culture; provide collaborative learning activities; accept students' uncertainties about the content material; confirm the capacity of students to learn; and personalize science so that students see the connections between the content and their personal lives.

Staff writer. (1998). 1998 exemplary programs show how six campuses address pressing issues. NASPA Forum, 20(2), 7-10

The National Association for Student Personnel Administrators (NASPA) conducted a national competition to identify exemplary programs located on postsecondary campuses that meet pressing issues. The Supplemental Instruction (SI) program from the University of Missouri-Kansas City was recognized through this process. This article provides a short overview of the SI program.

Stephens, J. E. (1994, Fall). Supplemental Instruction in developmental mathematics. Supplemental Instruction Update, 1-2

Based on a research study concerning the use of Supplemental Instruction (SI) with developmental mathematics courses at Tarleton State University (Forth Worth, TX), the data suggests the following: attendance at SI sessions is correlated with the perceived level of academic challenge in the course; academic achievement of SI participants is

correlated with the level of activity in the SI sessions; if there is extensive verbalizations of the thinking process by SI session attendees, females will tend to have higher achievement than males; and if there is low levels by SI participants of vocalizing the thinking process the academic achievement is similar for males and females.

Wilcox, F. K. (Ed.). Supplemental Instruction Update. Available: Center for Supplemental Instruction, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
The Supplemental Instruction Update newsletter is published by the National Center for Supplemental Instruction (SI) at the University of Missouri-Kansas City. Topics in the newsletter include: interviews with SI programs in programs around the world; articles discussing adaptions of the SI model; reports of SI research studies; information regarding upcoming training workshops for SI Supervisors and conferences for SI program managers; and other topics. Subscriptions are complimentary for anyone regardless of whether they have currently active SI programs.

Wilcox, F. K. (1992, Winter). Twenty years of Supplemental Instruction: An interview with Deanna Martin. Supplemental Instruction Update, 1, 6 Available: http://www.umkc.edu/cad/si/sidocs/ nldcm196.htm
This newsletter interview of Deanna Martin, creator of the Supplemental Instruction (SI) program, discusses the historical development of the model and its part in the development of collaborative learning in higher education. Martin believes that the next stage of development for SI is its mainstreaming of academic support and integration of learning strategies into the classroom. She reports of how SI is being used for faculty development.

Wilcox, F. K. (1996, Fall). Supplemental Instruction: Academic support in high-risk courses. Midwest Regional Association for Developmental Education Newsletter, 10-11
This newsletter article provides an overview of the Supplemental Instruction (SI) program.

Wilcox, F. K. (1996, Summer). Supplemental Instruction in South Africa: An interview with Andre Havenga. Supplemental Instruction Update, 1, 3
This interview describes the development of the Supplemental Instruction (SI) program at institutions in the Republic of South Africa. Andre Havenga is an SI Certified Trainer for South Africa and is also the Director of Instructional and Organizational Development at the University of Port Elizabeth (UPE). UPE provides SI support for 77 courses in 21 academic departments. Havenga reports the following benefits of the SI program: provides academic support for the new student subpopulations that were formerly excluded by government policy; academic support is mainstreamed with academic courses; provides faculty development through feedback that allows the instructor to clarify and provide additional information at the next class session; and provide another forum for social integration. SI leaders report a number of benefits for themselves: enhanced academic skills; improved self-confidence; additional work

experience that may help with job interviews; and additional contact with key faculty members from their discipline.

Wilcox, F. K. (1996, Summer). Supplemental Instruction in Sweden: An interview with Marita Bruzell-Nilsson and Leif Bryngfors. Supplemental Instruction Update, 1, 3 Available: http://www.umkc.edu/cad/si/sidocs/nlswed96.htm
This interview describes the development of the Supplemental Instruction (SI) program in Sweden. Academic assistance at postsecondary institutions in Sweden is a new movement. The interviewees are SI Supervisors at Lund University (Lund, Sweden) and are also Certified Trainers for SI. Nearly a dozen institutions in Sweden have established SI programs. SI leaders report that they like serving in the program since they have an opportunity to: develop their presentation skills; practice putting forth a point of view; and developing group management skills that will be useful when they become employed.

Wilcox, F. K. (1997, Spring). Supplemental Instruction in Australia: An interview with Ron Gardiner. Supplemental Instruction Update, 1-2
This interview with Ron Gardiner provides an overview of the development of Supplemental Instruction (SI) at institutions in Australia. Gardiner, a physicist, is an SI Certified Trainer and is Emeritus Professor and Coordinator of the SI program at Queensland University of Technology in Brisbane. An additional feature of the SI program is that the classroom instructor requests feedback from the SI leader concerning the comprehension level of the students. This provides an opportunity for the instructor to clarify or provide more information at the next class period.

Wilcox, F. K. (1998, Winter). Supplemental Instruction. NASPA IV West Newsletter, 4. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This short newsletter article provides a basic overview of the Supplemental Instruction (SI) program. The article three of the reasons that are commonly cited by institutions regarding why they have selected SI: (1) high risk courses are easy to identify; (2) SI meets the perceived needs of students; and (3) SI avoids a remedial image and is non-threatening.

Wolfe, R. F., & Wells, E. (1990, Winter). Community mentors for Supplemental Instruction. National Association for Developmental Education Newsletter, 12 Available: http://www.umkc.edu/ cad/si/sidocs/rwcmmn90.htm
Anne Arundel Community College (Arnold, MD) has made an adaption of the Supplemental Instruction (SI) to provide additional information concerning personal and career options related to the courses that have SI attached to them. A community person (mentor) is invited to attend one SI session for a course that is applicable to the mentor's field. A mentor may be a personal friend of the course instructor, or may be active in the vocational trade council, cooperative education, or advisory boards serving career programs at the college. The SI leader helps prepare the SI participants to generate

questions for the mentor's visit. The mentors become another partner in encouraging academic success and the meaningfulness of the course for future jobs. Upon mutual interest, the mentors and students may continue discussions outside of class and SI sessions that might result in job site visits or additional career discussions.

Section Six: ERIC Documents

Arendale, D., & Martin, D. C. (1997). Review of research concerning the effectiveness of Supplemental Instruction from the University of Missouri-Kansas City and other institutions. Kansas City, MO: The University of Missouri-Kansas City. (ERIC Document Reproduction Service No. ED 370 502) Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS Building #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/sidata97.htm This report provides both a narrative overview of the Supplemental Instruction (SI) model and a review of the major research studies concerning SI. A major portion of the research concerns a meta-analysis of SI research from 270 institutions from across the U.S. The analysis reviewed 4,945 research studies of 505,738 college students between 1982-83 and 1995-96. Regardless of institutional type or academic discipline, SI participants in comparison with non-participants receive mean final course grades that are higher (2.42 vs. 2.09), higher rates of A or B final course grades (46.8% vs. 35.9%) and mean percentages of D, F and withdrawal rates that are lower (23.1% vs. 37.1%). Even when the data is separated by broad academic disciplines or individual departments or classes, the positive differences for SI participants remain. In a national study of 13 institutions and 2,410 students, the question of helpfulness of SI for students of color was examined. The study found that students of color participated in SI at rates equal or exceeding those of White students (White, 33.8%; African American, 42.0%; Latino, 50.9%; Asian/Pacific, 33.3%; and Native American, 42.9%). Students of color received higher grades than similar students (2.02 final course grade vs. 1.55, rate of 36% for D, F, or W vs. 43% for non-SI participants). Studies from the University of Missouri-Kansas City mirror those from the national studies. A study of UMKC that examines 375 courses with an enrollment of 14,667 students year by year from 1980-81 to 1995-96 found that SI participants earned high mean final course grades, higher rates of A and B final course grades and lower rates of D, F and course withdrawals. In a Winter 1996 study concerning the potential bias of student motivation the results favored the SI participants. SI participants received: final course grade of 2.78, rate of 58.9% for final grades of A or B, rate of 17.2% for D, F or W. The non-SI motivational control group received lower levels of academic achievement: final grade of 2.16, 33.9% A or B, and 26.8% for D, F or W. All other non-SI participants received grades similar to the motivated non-SI group: final grade of 2.38, A or B rate of 42.7%, and 38.6% D, F or W. In a study of UMKC students separated into quartile groups on the basis of standardized entrance test scores, the SI participants outperformed their non-SI

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counterpart quartile group in nearly all comparisons. Top quartile: SI group 3.29 final course grade vs. 2.83 for non-SI, 92.9% reenrollment vs. 93.1% for non-SI; Middle two quartile groups: SI group 2.67 vs. 2.28, 90.5% reenrollment vs. 77.9% for non-SI; Bottom quartile: SI group 2.10 final course grade vs. 1.77 for non-SI, 85.6% reenrollment vs. 77.9% for non-SI. A study of SI attendance during Winter 1996 suggested a positive correlation between higher academic achievement and higher levels of SI attendance: no SI attendance: 2.37 final course grade, 42.2% A or B, 39.3% D, F or W; attended one to three times: 2.77, 56.3% A or B, 21.4% D, F or W; attended four to seven times: 2.82 final course grade, 63.0% A or B, 17.4% D, F or W. In a study of UMKC students who were first-time freshmen students in 1989, SI participants had graduated at a rate of 46.0% by Fall 1996 as compared with 30.3% of students who had never participated in SI. Other studies include research questions concerning demographic variables and rival hypotheses.

Harrington, J., & Moore, D. (1986). Say "Si" to supplementals. Paper presented at the 7th Annual Meeting of the Rocky Mountain Regional Conference of the International Reading Association, Colorado Spring, CO. (ERIC Document Reproduction Service No. ED 270 739)
This paper provides an overview of the Supplemental Instruction (SI) program. The authors describe a pilot test of the SI program with a Spanish class at the University of Nebraska-Omaha. Lessons learned from the pilot test of SI included: tie SI sessions to one course taught by one instructor; hire staff leaders for sessions; provide adequate feedback and constructive criticism for session leaders; and inform students that SI session attendance is not a substitute for independent studying.

Hawthorne, J., & Hawthorne, J. W. (1987). Separating the wheat from the chaff: Finding the unique effect of Supplemental Course Instruction. (ERIC Document Reproduction Service No. ED 328 201)
Supplemental Instruction (SI) at Olivet Nazarene University (CA) was examined through a study utilizing path analysis. Confounding factors such as the voluntary nature of the study sessions and the open admission policy of the college were controlled through path analysis/structural equation modeling. The analysis studied: 1) the effect of factors affecting SI participation, such as high school rank, marital status, semester load, and expected grade; and 2) the effects of SI participation on course grade, semester grade point average, and re-enrollment. Overall, path analysis explained 12.5 percent of the total variance of SI participation. Three of the exogenous variables have a direct, statistically significant, impact on SI participation: 1) The study found that the more a student is "at-risk" the more likely he or she is to use SI. 2) There is a direct positive effect between reported high school grades and SI participation. 3) The longer the student has been out of high school, the less likely he is to use SI. Two endogenous variables also have direct impacts on SI participation: 1) The more a student works, the less likely he is to attend SI sessions. 2) Students who expect to do well in the course are significantly more likely to attend SI sessions. SI participation had significant direct

effects on course grade, semester GPA, and reenrollment. Since there was direct effects of SI on grade point average and semester grade point average, the authors suggest the transfer of study skills learned to other courses.

Kenney, P. A. (1989). Effects of Supplemental Instruction on student performance in a college-level mathematics course. Paper presented at the 1989 Annual Meeting of the American Educational Research Association, San Francisco, CA: (ERIC Document Reproduction Service No. ED 347 874)
This paper describes a research study that used Supplemental Instruction (SI) in a first-semester calculus course for business and economics majors at the University of Texas at Austin. The experimental design for this study used Campbell and Stanley's Nonequivalent Control Group model. The study used two lecture classes with the same instructor. Each class was divided into two discussion sections, and of those, one from each received the SI treatment. In the control sections the teaching assistant performed typical duties. In the SI sections the assistant performed the same duties but in addition she provided instruction on the study skills relevant to the course as it progressed and other activities that SI leaders would perform or facilitate. The results showed a statistically significant difference favoring the SI treatment group: the control group mean course grade point average of 2.43 and that for the treatment group of 3.00; the control group mean semester grade point average (GPA) of 2.51 and that for the treatment group GPA of 2.95. A multiple linear regression model was then chosen as a more complete method of analysis. Three of the independent variables had coefficients which were significant at the .05 level -- high school class rank, discussion section attendance, and control/treatment group membership. This helps to answer the question of whether SI was just a form of "double exposure" to the course content. Since SI sessions were qualitatively different than the traditional discussion sections (as evaluated by outside observers using a observation protocol) and that the students who participated in the SI sessions earned higher mean final course grades, it appears that SI sessions were more than double exposure. A multiple regression analysis of semester grade point average found that three of the variables were significant at the .05 level -- the SAT Mathematical score, discussion section attendance, and group membership.

Martin, D. C., & Arendale, D. (1990). Supplemental Instruction: Improving student performance, increasing student persistence. Kansas City, MO: University of Missouri-Kansas City. (ERIC Document Reproduction Service No. ED 327 103)
This report describes the Supplemental Instruction (SI) program at the University of Missouri-Kansas City. Among the topics in the paper: narrative overview of the SI model; history of the development of SI at UMKC and other institutions across the U.S.; outcomes for students and the institution; and potential for adoption by other institutions.

Maxwell, M. (1997). What are the functions of a college learning assistance center? (ERIC Document Reproduction Service, No. ED 413 031).

To be effective, college learning assistance centers (LACs) must reflect the mission and goals of the institution and be coordinated with existing programs and services. Based on the professional literature, LACs engage in fourteen major functions. One of them is providing Supplemental Instruction (SI) for academic support and enrichment in historically-difficult courses. Although most SI programs are voluntary and offer no credit, there are exceptions. At California State University at Long Beach the Learning Assistance Center offers 20 to 30 SI classes in different academic subjects each term. These students can earn one academic credit for attending weekly SI sessions and completing other course requirements.

Ochae, R. (1995). Writing partners: Improving writing and learning through Supplemental Instruction in freshman writing classrooms. Paper presented at the Annual Meeting of the National Council of Teachers of English in San Diego, CA: (ERIC Document Reproduction Service No. ED 395 323) Available: http://www.umkc.edu/cad/si/sidocs/rowrit95.htm
A study was conducted at Black Hills State University (SD) which has an open admission policy and high attrition and dropout rates in the first writing course. Results suggested that SI helped SI participants to improve writing skills (gain of 15.7% on standardized test vs. 14.0% for courses taught by the same professor but without SI), earn higher mean final course grades (2.6 vs. 2.5, reduce failure rates (13.8% vs. 16.0%), and lower course withdrawal rates (6.1% vs. 6.9%).

Warren, B. Z. (1997). Personality, learning style, gender, and ethnic characteristics of students attending Supplemental Instruction. Paper presented at the Annual Teaching/Learning Conference, October 10-11, 1997, Ashland, KY. (ERIC Document Reproduction Service, No. ED 413 019).
A study was conducted to gather information on students participating in Supplemental Instruction (SI) at the University of Central Florida in Spring 1997. Using Long's Personality Checklist, 163 students classified themselves as aggressive-dependent, aggressive-dependent, passive-independent, or passive-dependent. Kolb's Learning Style Inventory was administered to the group. Findings included: (1) Although the majority of SI students were White and female with aggressive-dependent personality styles, science students displayed assimilator and converger learning styles, while non-science students displayed accommodator learning styles. (2) Hispanics most commonly identified their learning style as assimilator. (3) Black and Hispanic students showed the least inclination toward the converger learning style, while it was one of the main styles displayed by White students.

Wolfe, R. F. (1991). Supplemental Instruction with mentoring support at Anne Arundel Community College. Arnold, MD: Anne Arundel Community College. (ERIC Document Reproduction Service, No. ED 413 942).
Anne Arundel Community College's Supplemental Instruction (SI) with Mentoring Support provides a program of academic support for students enrolled in difficult

required courses, while also creating valuable opportunities for faculty professional development and community interaction. By adapting the SI model for the community college, this program has trained students and faculty to work together to facilitate learning and thinking skills through a learner-centered approach of peer group study and community and faculty mentoring support. Student SI leaders are trained through a three-credit hour practicum in education course. Faculty who are trained in study skills and learning strategies through a three day pre-term training seminar: attend classes and study sessions in courses outside their discipline for the first four weeks of the academic term; work as mentors to student SI leaders to prepare strategies for SI sessions; work with SI leaders to create supplemental materials; formally evaluate SI leaders during the second half of the academic term; and maintain a daily journal. In evaluating the project, faculty mentors stated the program provided an opportunity to broaden their professional expertise and their perspectives on student learning. They had developed new teaching approaches, an awareness of their teaching styles, and an understanding of students' needs. A second modification to the SI program provided local community leaders in their career fields to provide mentoring support in small group sessions and on-site visits. On the day of the community leader's visit, SI leaders conduct an abbreviated SI session, giving the community mentor the opportunity to observe and participate in an SI session. Then, the community mentor speaks informally with students, discussing career related topics and answering students' questions.

Zaritsky, J. S. (1989). Peer tutoring: Issues and concerns, results of a survey. Long Island City, NY: La Guardia Community College. (ERIC Document Reproduction Service No. ED 315 134)
In 1988, a survey was conducted to determine the characteristics and extend of peer tutoring program at two- and four-year colleges in New York. Findings included: 95 percent of institutions had at least one peer tutoring program; 2) 41 percent had centralized tutoring labs; 3) institutions most commonly provided Supplemental Instruction in mathematics, biology, business, chemistry, and English; and 4) 96 percent provided peer tutors with training.

Zaritsky, J. S. (1994). Supplemental Instruction: A peer tutoring program at La Guardia Community College. Long Island City, NY: La Guardia Community College. (ERIC Document Reproduction Service No. ED 373 850) Available: http://www.umkc.edu/cad/si/sidocs/jzpeer94.htm
This report describes the use of Supplemental Instruction (SI) at La Guardia Community College (NY). In spring 1993, an SI program was pilot tested in Principles of Accounting I, Introduction to Economics I and Fundamentals of Human Biology I courses. In Economics I the SI participants received a higher percent of A, B, and C final course grades (37% vs. 27%) and a lower rate of D, F, and course withdrawals (63% vs. 73%). In Economics I the SI participants received a higher percent of A, B and C final course grades (51.7% vs. 43.6%) and a lower rate of D, F and course withdrawals (48.3% vs. 56.4%). In Human Biology I the SI participants received a

higher rate of A, B, and C final course grades (63.2% vs. 48.3%) and a lower rate of D, F, and course withdrawals (36.7% vs. 51.7%). Some SI leaders reported personal improvement in the following areas: higher self confidence since they helped other students to do better; increased content knowledge through second review of the course; improved interpersonal communication skills; accelerated emotional and intellectual growth.

Section Seven: Published Conference Proceedings

Arendale, D. (1994). Supplemental Instruction: Providing academic assistance at small colleges. The Freshman Year Experience 7th Annual Conference for Small Campuses Conference Program and Proceedings (pp. 61-62). Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 374 765)
This paper describes the use of Supplemental Instruction (SI) in small colleges to provide academic support.

Arendale, D. (1997). Supplemental Instruction: Review of research concerning the effectiveness of SI from The University of Missouri-Kansas City and other institutions across the United States. In Proceedings of the 17th and 18th Annual Institutes for Learning Assistance Professionals: 1966 and 1997 (pp. 1-25). Tuscon, AZ: University Learning Center, University of Arizona. Available: www.pvc.maricopa.edu/winderinstitute/proceedings/967_proc/967proc_arendale.html
This paper provides a narrative overview of the Supplemental Instruction (SI) model and a review of the major research studies concerning SI. The studies are based on data from the University of Missouri-Kansas City and a separate data base of nearly 5,000 research reports describing the use of SI at 270 institutions with a total student enrollment of more than 500,000 in the classes where SI was offered.

Arendale, D., & McLaren, A. (1999). Supplemental Instruction: Variations on the basic theme. In Selected Proceedings of the 16th (1997) & 17th (1998) Annual Conferences of the Pennsylvania Association of Developmental Educators (pp. 40-44). Pittsburgh, PA: The Community College of Allegheny County
This paper describes some of the successful variations of Supplemental Instruction (SI). After an initial overview of SI, descriptions about innovations of the model. The first concerns Video-based Supplemental Instruction (VSI). VSI is described as an information delivery system. College students enroll in telecourses that are identical to credit courses delivered live on campus by the same professor. Students enrolled in these VSI course sections attend class eight hours a week rather than three hours since the videotape lectures are frequently stopped to engage in SI session activities. Developmental level students enrolled in VSI course sections earn higher final course grades than the traditional students enrolled in the live course sections. The second

variation of the SI model is to use it for faculty development and renewal. Successful models include Salem State College and Anne Arundel Community College. Common activities include: SI leader providing anonymous feedback to the course lecturer; lecturer incorporating SI session activities inside of class sessions; lecturers serving as assistant SI supervisors and expanding their instructional/learning skills by observing other professors; and other associated activities.

Barrett, M., Sutcliffe, P., & Smith, B. (1994). Students as mentors: The case of management education. *Proceedings of the Conference of the Australian and New Zealand Academy of Management* Wellington, Australia: Australian and New Zealand Academy of Management. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This paper describes the use of Supplemental Instruction (SI) to have advanced-level students (peer mentors) help commencing students (mentees) overcome the teaching and learning problems often associated with large lecture-based introductory courses in management in several courses at Queensland University of Technology (Australia). "Management and Organization" has the primary focus for this study. Students who attended six or more sessions had significantly higher final course grades than those who attended less than six times. It appears that motivation or self-selection was not a major variable since the students who attended six or more times had a similar academic profile to students who did not attend at the same frequency. Surveys of students suggested that the mentoring program helped them to develop new study strategies and approach the material in a more effective manor. Mentors reported that they improved their interpersonal communication skills, ability to mange group dynamics, and enhanced their personal study skills.

Bruzell-Nilsson, M., & Bryngfors, L. (1996). Use of Supplemental Instruction to improve student learning in Sweden. *A passport to enhanced student learning, success, satisfaction, and retention. Proceedings of the International Conference on the First-Year Experience, St. Andrews, Scotland* (pp. 67-68). Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 398 792)
This article describes the use of Supplemental Instruction (SI) at postsecondary institutions in Sweden. Both a basic overview of the SI model and adaptions to the SI model for use in Sweden are shared.

Cezar, T., & Gordy, K. (1985). Supplemental Instruction: A model of academic support. *Published Conference Proceedings of the Midwest Regional Association of Developmental Educators* St. Louis. MO: Midwest Regional Association of Developmental Educators
This paper describes the use of Supplemental Instruction (SI) with improving academic achievement of students in historically difficult courses.

Clark, C., & Koch, E. (1997). Supplemental Instruction for the South African context: A case study at the University of Port Elizabeth. In R. B. Ludeman, & S. Hubler (Eds.), Quality student services around the world: Bridging student needs and student success (pp. 124-146). Washington, D.C.: National Association of Student Personnel Administrators. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes how the Supplemental Instruction (SI) program was adapted for use at the University of Port Elizabeth (UPE) in the Republic of South Africa. Issues discussed in the paper include: perceptions and academic performance of first year students; diversity in student composition in terms of language, culture and educational background; departments and curriculum developments; and the personal growth of SI leaders. SI is offered to students in 19 departments offering 25 courses in the Faculties of Science, Arts, Law, Economics, Social Science, and Health Science. The SI program is supervised by the Centre for Organisational and Academic Development (COAD). In a qualitative and quantitative study of students from Fall 1995 SI participants earned higher grades than nonattendees in nearly all courses. Follow up in the other courses suggested that SI was less than effective due to heavy time tabling of the students that precluded their regular attendance in SI sessions. Feedback provided through the SI program led to curricular reform in several courses where many students experienced academic challenges. SI was found to be equally effective for students from racially diverse and academically disadvantaged backgrounds. Faculty development activities occurred when lecturers attended SI leader training workshops and embedded SI session activities inside their traditional classroom presentations. The researchers suggested that participating lecturers changed their lecture style, made changes to the curriculum, and became more sensitive to diversity issues. SI leaders reported changes due to their involvement: reinforced knowledge of the academic discipline; improved personal academic performance; increased their facilitation and interpersonal skills; increased personal self esteem and confidence levels; and increased career opportunities due to skills in group facilitation.

Commander, N. E., Callahan, C. A., Shatton, C. B., & Smith, B. D. (1997). Adjunct courses and Supplemental Instruction: A ten step workshop. In Selected conference papers of the National Association for Developmental Education, Volume 3 (pp. 14-16). Mobile, AL: University of South Alabama. Available:
http://www.umkc.edu/cad/nade/nadedocs/97conpap/nccpap97.htm
At Georgia State University there has been a transition from focusing on developmental courses for some to offering learning support for all students. The authors provide ten questions that can guide an institution as they consider offering Supplemental Instruction (SI) and adjunct courses. In 1996 the institution was offering SI in 28 course sections will a combined enrollment of 3,900 students. About one-third of the students participated in SI sessions. SI participants earned between one half to a full letter grade higher in comparison with similar non-SI attendees. The ten questions that the authors suggest when designing a new learning support program are: 1. What makes

your campus unique? 2. What population do you wish to serve? 3. What courses will you target? 4. How will you build faculty support? 5. How will you market your program? 6. How will you design your curriculum? 7. What results will you share with colleagues in your institution? 8. What results will you share with colleagues outside your institution? 9. How will you secure campus resources? 10. What problems are unique to your situation and what are possible solutions?

Cross, I. G. (1997). Peer support through Supplemental Instruction for civil engineering students. Proceedings from the 2nd Working Conference on Engineering Education: Professional Standards and Quality in Engineering Education (pp. 97-102). Sheffield, England: Sheffield Hallam University
This article describes the use of Supplemental Instruction for civil engineering students in the United Kingdom.

Gardiner, R. (1996). Supplemental Instruction: A cost-effective, student-centered collaborative learning program. Proceedings of the Second International Open Learning Conference (pp. 214-219). Brisbane, Queensland, Australia: International Open Learning Conference. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This paper presented by Emeritus Professor Ron Gardiner of Queensland University of Technology describes the use of Supplemental Instruction (SI) in Australia. After an extensive description of the SI model, program benefits for the SI Leaders and the course instructors are described. Benefits to the SI Leaders include: deeper understanding of the course content; development of leadership and group facilitation skills; increased self-confidence; improved job marketability and admission to advanced graduate work due to service as SI Leader; development of professional relationship with course professor; membership in an effective peer support network; and modest financial reward. Benefits for the course professors that have SI attached to their lectures: timely feedback concerning the comprehension level of the students regarding course material; opportunity to repeat previous lecture material in a modified fashion to increase comprehension; an option to modify future teaching strategies based on feedback from students; a basis for accessing additional funds through grants (e.g., teaching and learning development grants); increased rapport with students and SI Leaders; membership in local, national and international SI network; increased recognition from their colleagues; and increased satisfaction with their teaching role. The institution benefits in several ways: deployment of a cost-effective, student-centered learning enhancement program; membership in national and international SI networks; and effective means of managing the collective learning power of its students.

Gordy, K. (1987). Supplemental Instruction in the context of critical thinking. Proceedings of the Intellectual Skills Development Association Conference San Diego, CA: Intellectual Skills Development Association

This paper describes the use of Supplemental Instruction (SI) to increase the level of critical thinking by students enrolled in historically difficult college courses.

Gravina, M. (1990). Supplemental Instruction: A collaborative experience. Conference Proceedings of the Southeastern Conference on At-Risk Students Savannah, GA: At-Risk Students Association
This article provides an overview of the Supplemental Instruction (SI) program.

Gravina, M. (1990). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. Proceedings of the Freshman Year Experience Conference in Austin, TX Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1990). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. Proceedings of the Freshman Year Experience Conference in Tampa, FL Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1990). Supplemental Instruction and enhanced performance in social science classes. Conference Proceedings of the National Social Science Association Louisville, KY: National Social Science Association
This article provides an overview of the Supplemental Instruction (SI) program.

Gravina, M. (1990). Supplemental Instruction: Success with diverse student populations. Conference Proceedings of the Minority Student Today Conference San Antonio, TX: Minority Student Today Conference
This article provides an overview of the Supplemental Instruction (SI) program. Data suggests that the SI program is helpful for all students, regardless of their ethnic background or previous levels of academic preparation.

Gravina, M. (1991). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. Proceedings of the Freshman Year Experience Conference in Kansas City, MO Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition
This article provides an overview of the Supplemental Instruction program.

Gravina, M. (1991). Supplemental Instruction: A continuation of the goals of the Freshman Year Experience. Proceedings of the Freshman Year Experience Conference in Long Beach, CA Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition
This article provides an overview of the Supplemental Instruction program.

Healy, C. E. (1994). Supplemental Instruction: A model for supporting student learning. Proceedings of the International Conference on Group and Interactive Learning (pp. 171-176). Southampton, England: Computational Mechanics Publications
This article describes the implementation of Supplemental Instruction in engineering courses at Glasgow Caledonia University in Scotland. The University is seeking to initiate cultural change through partnership events involving students, staff and employees. Research studies suggested improvements by both the SI participants (64.8 percentile vs. 54.4 percentile for non-SI participants) and the SI leaders. Some SI leaders reported that they had now considered pursuing a teaching career based on the positive experience with the SI program.

Hillman, J. C. (1996). The value of Supplemental Instruction in conceptual learning. In Proceedings of the 1996 4th AFRICON Conference (pp. 288-292). New York, NY: Institute of Electrical and Electronics Engineers
Undergraduates have difficulty with courses that are conceptual in nature. The internalization of concepts and the development of problem solving skills is achieved by individuals in a variety of ways, relatively few of which are known by lecturers or actively sought. Supplemental Instruction (SI) can overcome these problems by encouraging students to learn from the experiences of others by participating in structured group discussions which are facilitated by senior students. This paper describes the development of an SI program with a first year electrical engineering course and concludes that it is both an efficient and cost effective methods of improving student learning, particularly for those from an educationally disadvantaged background.

Johnston, C. (1995). Peer tutoring in Economics at the University of Melbourne. In Australian Economic Education Symposium Proceedings (pp. 48-71). Adelaide, Australia: University of Adelaide
This paper describes an adaptation of the Supplemental Instruction (SI) model used at the University of Melbourne (Australia) in 1993. The model integrates Diploma of Education students in an undergraduate economics group learning program (Macroeconomic theory and Macroeconomic Policy). Several adaptations of the SI program: the group facilitator was a volunteer postgraduate Diploma of Education student; two wine and cheese evenings were scheduled to provide the facilitator and students to interact socially and exchange experiences with one another. It found that small groups operate more effectively in terms of group cohesion, longevity and perception of improved performance when supported by postgraduate students. Postgraduates developed an enhanced range of skills in relation to group management, cooperative learning and communication.

Kelly, B. A. (1995). Peer-Assisted Study Sessions: An instrument for quality assurance in high risk subjects. Higher Education Research and Development Society of Australia Conference Proceedings . Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA

This paper describes the use of Peer Assisted Study Sessions (PASS), a local name for the Supplemental Instruction program as it is used at the Queensland University of Technology in Australia. The PASS program is being used as part of the institution's quality assurance (QA) system to regularly examine the needs of its customers (i.e., students enrolled in the courses that had PASS attached to them, faculty members who taught the courses, and the general community who employed the students). There was special concern for courses in which the faculty members were instructing students from other college majors. The PASS leaders served as a conduit for weekly communications with the faculty members regarding the comprehension level of the students and can make decisions regarding modifying their classroom delivery. This "just-in-time" feedback system provides immediate benefit to the students and lectures as weekly incremental improvements can be made.

Knott, A. (1997). Towards developing a theoretical and institutionally contextualised model of Supplemental Instruction in the curriculum which entails greater intra- and inter-institutional collaboration between Supplemental Instruction supervisors and academic development practitioners in the region. 1997 South African Association for Academic Development Conference Proceedings Vista University, Port Elizabeth Campus, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
This paper critically discusses the model of Supplemental Instruction (SI), an academic student assistance program that has been implemented on the Port Elizabeth campus of Vista University within the context of offering suggestions on how SI can be used by academic development (curriculum and institutional development). SI is one part of a comprehensive learning environment that promotes alternative teaching and learning methodologies and delivery systems that are relevant to the diverse needs of all students.

Koch, E. (1996). The relationship of attendance of Supplemental Instruction with the performance of first year students at the University of Port Elizabeth. Proceedings of the Conference on Student Contributions to Learning (pp. 104-127). Rhodes University, Grahamstown, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
The use of Supplemental Instruction (SI) at The University of Port Elizabeth (South Africa) was investigated by examining the statistical relationship of attendance of SI with performance through multiple regression analysis. The sample consisted of first year students in the Science and Humanities faculties. In most of the courses there was a positive relationship between attendance of SI and performance. This was especially true for students who attended five or more times.

Lockie, N. M., & Van Lanen, R. J. (1997). Nursing students' success and retention in chemistry courses: A collaborative approach. 1997 International Nursing Research Congress Abstracts Indianapolis, IN: Sigma Theta Tau

This article describes the use of Supplemental Instruction (SI) with improving academic performance of nursing students in chemistry courses. The authors used the SI program at Saint Xavier University in Chicago, IL.

Loh, H. (1993). Peer Assisted Study Sessions in anatomy for nursing students. Peer tutoring: Learning by teaching (pp. 193-201). Auckland, New Zealand: The University of Auckland. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This article describes the use of Peer Assisted Study Sessions (PASS), the local institutional name for their adaptation of the Supplemental Instruction (SI) model at Queensland University of Technology (Brisbane, Queensland, Australia). Following an institutional commitment to Total Quality Management (TQM), some TQM principles were found consistent with the SI model of academic achievement. An anatomy course with first year nursing students was selected as a pilot for the SI program. Program outcomes include the following for SI participants: reported an increase in their confidence with the course after participating in SI sessions (87%); reduced percent of students failing the course (7.8% vs. 19.3%); agreed that the SI leaders motivated them to work harder (80%); increased their learning skills (90%); increased their understanding of the content material (87%); and increased their ability to apply the knowledge gained from class lectures (82%). SI leaders reported the following benefits to them: developed leadership and character, improved their own learning and facilitating techniques, acquired skills in group management, developed presentation skills, and increased their own confidence and self esteem.

Loh, H. (1993). Strategies to overcome the high failure rate in a subject. Proceedings of the 6th International Conference on the First Year Experience, July 10-13, 1993, Boston, MA (p. 39). Columbia, SC: The National Center for the Study of the Freshman Year Experience and Students in Transition. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
The Queensland University of Technology (Brisbane, Australia) has investigated the applicability of Total Quality Management (TQM) for improving student academic success. An anatomy course for nursing students saw its failure rate drop from 22.8% to 13.6% after the introduction of several interventions, including Supplemental Instruction (SI). The local institutional name used is Peer Assisted Study Sessions (PASS). Course lecturers listed the following benefits of the program: rapid dissemination of information and instruction to students via the SI leaders; rapid feedback from students concerning course content; provided small group benefits in large lecture classes; improved and increased the amount of communications between students and the lecturer; and the lecturer was able to give students increased responsibility for the learning process. SI leaders mentioned the following benefits to themselves: developed leadership and character, improved their own learning and facilitating techniques,

acquired skills in group management, developed presentation skills, and built their own confidence and esteem.

Loh, H. (1994). Strategies to overcome the first year high failure rate in anatomy for nursing students. Proceedings of the 7th International Conference on the First-Year Experience, Dublin, Ireland (pp. 79-80). Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels (87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections ($n = 400$); instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Loh, H. (1996). Supplemental Instruction: A peer collaborative learning program applied within anatomy for first year nursing students. Proceedings of the 2nd Pacific Rim Conference on the First Year in Higher Education (pp. 281-290). Melbourne, Queensland, Australia: University of Melbourne. Available: Center for Supplemental

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Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels (87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections ($n = 400$); instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Marra, R. M., & Litziner, T. A. (1997). A model for implementing Supplemental Instruction in engineering. In Proceedings of the 1997 Annual Conference on Frontiers in Education Conference (pp. 109-115). Pittsburgh, PA: International Electrical Engineers in Education Supplemental Instruction (SI) is used at Pennsylvania State University (University Park, PA) to held students earn higher grades in electrical engineering courses.

Martin, D. C. (1994). Video-based Supplemental Instruction: An alternative to remedial courses. The national forum on new student athletes. Proceedings of the Freshman Year Experience Conference on the First-Year Experience, Columbia, SC (pp. 33-34).

Columbia, SC: The National Resource Center for the Freshman Year Experience and Students in Transition. (ERIC Document Reproduction Service No. ED 370 895)
This article describes the use of Video-Based Supplemental Instruction (VSI) at the University of Missouri-Kansas City. Both a basic overview of the VSI model and a data study of the pilot study at UMKC. Though the VSI students are less prepared academically than the students in the large lecture class, the VSI group received higher mean final course grades (3.64 vs. 2.41), higher overall reenrollment rates (94 percent vs. 85 percent), and higher reenrollment rates for academic probationary students (100 percent vs. 45 percent).

Martin, D. C., Hall, P. T., & Arendale, D. (1991). Academic success for inner city high school youth: The positive effects of Supplemental Instruction with an urban high school. Proceedings of the National Association of State Universities and Land Grant Colleges Conference Washington, D.C.: National Association of State Universities and Land Grant Colleges. Available: http://www.umkc.edu/cad/si/sidocs/dadmhs93.htm
This paper describe the use of Supplemental Instruction (SI) with an urban high school in Kansas City, Missouri. Westport High School is a culturally-diverse school located in the central city. Over half the students were one or two years behind grade levels in reading and mathematics and an equal number were economically disadvantaged. SI was provided to students enrolled in 9th and 10th grade English and history classes. SI sessions were scheduled during a scheduled time during the school day three times each week. Research studies suggested that there was improvement in final course grades of students in the English (A and B grades: 28.7% vs. 13.6% before SI; F grades: 23.2% vs. 32.7% before SI)and history classes. Interviews with students and teachers suggest that participation in the SI program also promoted higher levels of class participation and higher achievement on standardized test scores.

McGlone, F. D. (1995). The integration of the principles of Supplemental Instruction in undergraduate law subjects. Proceedings of the Inaugural Pacific Rim First-Year Experience Conference Brisbane, Australia: National Center for the Study of the Freshman Year Experience and Students in Transition. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This paper describes the use of Supplemental Instruction (SI) at two classes in Australia's Queensland University of Technology Faculty of Law. SI was contextualized for use within the law curriculum as was described as a Student Peer Mentor (SPM) program. The program concentrated on improving qualitative learning outcomes for the students: promote student use of deep approaches to learning, develop generic lifelong learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with their peers. Several unique features of SPM are identified: selected classes are not historically difficult, the class instructor and the SPM supervisor are the same person, and that the class has always provided a one hour staff-

led small group seminar for each two hours of lecture. Other than those previously noted , many common features are shared by SI and SPM.

Murray, M. H. (1996). Resources for the resourceless: Maximizing student learning. Proceedings of the 8th Conference of the Australian Association of Engineering Education (pp. 162-166). Sydney, Australia: Australian Association of Engineering Education. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This article (which won "Best Paper" award at the conference) describes the use of Supplemental Instruction (SI) in the School of Civil Engineering, Queensland University of Technology (Australia). A basic engineering statics course in the first year has been transformed from a traditional lecturer-centered teaching mode into a student-centered resource-based model. Central to this transformation has been the integration of SI into the course. The SI sessions focus on interaction, discussion, and investigation rather than just simple problem solving. Before integration of SI in the course the total class (SI and non-SI students) mean final score was 46, in 1996 after the integration the score increased to 55. These results are based on the aggregated score from four quizzes during the semester, from a spaghetti bridge design/build/test project, and from a final end-of-semester exam. Based on standardized scores, the students in 1996 were less academically prepared than the ones in 1994 before SI was introduced. The SI participants received a higher mean final percentile grade in each year of the study (1995: 48 vs. 41; 1996: 56 vs. 42). There was a positive increase in final course score and higher levels of SI attendance. Students evaluated the SI session most useful of all course components (SI sessions, 53%; lecture, 22%; text book, 16%; study guide, 13%; and tutorial, 9%). SI leaders mentioned the following benefits of the program for themselves: increased skill in group management; improved public speaking; gained skills in team building; increased group facilitation skills; improved personal time management; and increased interest from potential employers because of skills developed as a SI leader.

O'Donnell, L. E. (1995). Inclusion for learning disabilities: Technology with learning variables research and Supplemental Instruction. Empowering children with special needs: Practices around the world (pp. 192-195). Whitewater: International Association of Special Education
Learning Variables Research and Supplemental Instruction (LVR/SI) provide an innovative approach to inclusion for intellectually normal and gifted students with learning disabilities. The original Supplemental Instruction (SI) model is generally used with traditional college undergraduate and graduate students. Video-based Supplemental Instruction (VSI) allows enrolled high school or college students view the videotaped lectures of a college level course (e.g., Western Civilization, General Chemistry) and allow them opportunity to control the flow of information (e.g., stop, repeat, discuss material before proceeding). SI, and especially VSI, can be very helpful for students with learning disabilities since they can be served inside the same content

class rather than requiring an additional class for the students to attend to deal with their specialized learning needs. The LVR/SI approach refines either the SI or VSI model with individualized learning variables and computer technology for application in junior high, senior high, and higher education. Rather than using video tape with VSI, computer technology might be substituted. In addition, the SI leader or VSI facilitator is provided critical information about students with disabilities. This technology-based program allows individuals with learning disabilities to succeed academically in integrated, inclusive classrooms.

Peled, O. N., & Kim, A. C. (1996). Supplemental Instruction in Biology at the college level. Selected Conference Papers of the 19th Annual Conference (pp. 23-24). Chicago, IL: National Association for Developmental Education. (ERIC Document Reproduction Service, ED 394 414)
Supplemental Instruction (SI) in 14 biology classes at National Louis University (Chicago, IL) was found to significantly increase student achievement (74.1 percentile vs. 67.6 percentile for non-SI participants). An additional analysis studied students with low grades (below the 60th percentile) and high grades (above the 80th percentile). SI attendance was positively correlated with higher grades. Many of the SI leaders in biology have been students intending to major in elementary education.

Quinn, K. B. (1990). Retaining undergraduates and training graduates: A variation on Supplemental Instruction in a College Biology class. Selected Conference Abstracts of the 14th Annual Conference of the National Association for Developmental Education (pp. 48-49). Chicago, IL: National Association for Developmental Education. Available: http://www.umkc.edu/cad/si/sidocs/kqreta90.htm
This article described a retention program based on a variation of the Supplemental Instruction (SI) model piloted in the Academic Skills Program at the University of Illinois at Chicago. SI leaders were graduate students enrolled in the Masters of Teaching Science program at the university. The intent of the pilot program was not only to increase the academic performance of students and the number of students who completed Biology 102 -- one of the most difficult courses for non-majors at the university -- but also to provide a training experience for graduate students who were going into teaching science in the public schools and the community colleges. Research suggests that freshmen SI participants earned higher mean final course grades (3.23 vs. 2.90). Students who attended SI six or more times during the academic term received no lower than a final course grade of B. There was a positive correlation between SI attendance and higher grades (zero to five point scale): attended one SI session, mean final course grade of 3.16; attended two to five, 3.56; attended six to ten, 4.50; attended eleven to twenty-seven, 4.00.

Rust, C., & Price, M. (1994). Improving students' skills through Supplemental Instruction. Proceedings of the 2nd International Symposium on Improving Student Learning (pp. 386-395). Oxford, England: Oxford Centre for Staff Development

Oxford Brookes University in the United Kingdom is using the Supplemental Instruction program in the School of Business. SI was implemented with larger business courses (400 to 500 students) to enhance the learning environment for the students enrolled in these elective courses that are outside their field of study. Rather than paying the SI leaders, they were given academic credit for the experience. The research studies of students enrolled in the targeted courses suggested a positive correlation ($p < .05$) between SI participation (two or more times) and higher final course grades (Introduction to Business, 61.4 percentile vs. 56.2 percentile for non-SI participants; Managing Concepts, 60.7 vs. 54.6; and Changing Environment of Business, 56.6 vs. 46.2).

Stratton, C. B., Commander, N. E., Callahan, C. A., & Smith, B. D. (1997). From DS to LS: The expansion of an academic preparation program from developmental studies to learning support. Selected Conference Papers of the National Association for Developmental Education, Volume 2 (pp. 42-44). Mobile, AL: University of South Alabama. Available: http://www.umkc.edu/ cad/si/sidocs/cccpap96.htmWith increased emphasis on student retention, a model for expanding academic support through Supplemental Instruction was developed to provide a comprehensive program for a larger population at Georgia State University (Atlanta, GA). Research studies suggested that SI participants earned higher mean final course grades. In addition, students whose predicted success (based on SAT scores and a formula predicting GPA) was low outperformed their peers predicted to be more successful.

Visor, J. N., Johnson, J. J., Schollaet, A. M., Good-Majah, C. A., & Davenport, O. (1995). Supplemental Instruction's impact on affect: A follow-up and expansion. Proceedings from the 20th Annual Conference on Developmental Education (pp. 36-37). Chicago, IL: National Association for Developmental Education. Available: http://www.umkc.edu/cad/si/sidocs/ jvaffl95.htm
Following up a previous study (Visor, Johnson, and Cole, 1992), the authors sought to determine whether positive change in certain affective variables was associated with participation in Supplemental Instruction (SI): locus of control, the feeling of being in charge of one's own destiny; self-efficacy, beliefs about one's ability to succeed at a given task; and self-esteem. Students from an introductory psychology course at Illinois State University (Normal, IL) were studied in fall of 1994. Students were divided into three categories of participation: regular participants (4 or more times during the term); occasional participants (1 to 3 times); and nonparticipants. The data suggested the following trends. Among freshmen, regular participants tended to have (a) higher self-esteem than nonparticipants, (b) greater self-efficacy than nonparticipants, and (c) greater internal locus of control than nonparticipants and occasional participants. Among upperclassmen, regular participants tended to have (a) higher self-esteem, (b) greater self-efficacy, and (c) greater internal locus of control than nonparticipants and occasional participants. A causal relationship between SI participation and these

affective changes is difficult to empirically establish due to confounding demographic variables.

Webster, T., & Dee, K. C. (1997). Supplemental Instruction benefits students in an introductory engineering course. Proceedings of the Conference on Frontiers in Education (pp. 101-108). Pittsburgh, PA: International Electrical Engineers in Education This paper describes the use of Supplemental Instruction (SI) during Fall 1996 in Introduction to Engineering Analysis at Rensselaer Polytechnic Institute (Troy, NY). The course is generally taken in the first semester of the freshman year and covers vector mechanics (statics), linear algebra, and computer-based matrix methods for solving engineering problems. Of the students in the class, 23 percent participated in SI sessions. Students who participated in SI earned higher mean final course grades (3.13 vs. 2.67, $p < .025$), higher rate of A & B final course grades (77% vs. 62%, $p < .01$) and received a lower rate of D, F or withdrawals (0% vs. 18%, $p < .01$). There was a positive correlation between higher levels of SI attendance and higher final course grades. All students who attended at least four SI sessions throughout the semester received a final course grade of A or B. A subpopulation of students who were designated as "at-risk" or "high risk" were studied. SI participants earned higher grades their counterparts who did not attend SI sessions (At-risk: 2.60 vs. 2.18; High-risk: 2.38 vs. 1.58; $p < .01$). The researchers reported that unfortunately half of these students did not participate in any SI sessions. Surveys of students suggested the following improvements for the SI program: hold more sessions during the academic term to help reduce SI session size (mean size = 13); hold SI sessions longer than one hour to provide sufficient time to deal with material; and consider more than one SI leader to allow smaller SI session size. SI leaders provided feedback to the course instructor concerning the comprehension level of students concerning the course material. Instructors used the feedback to modify future course lectures. SI leaders the following benefits of the SI program for themselves: deeper understanding of course material, excelled in other courses since they were reviewing basic concepts in the SI course, developed communication skills, improved teaching skills, and enhanced leadership skills.

Wolfe, R. F. (1988). Supplemental Instruction with mentoring support at Anne Arundel Community College. Proceedings from the 1988 Midwest College Learning Center Association Conference. (pp. 106-108). Midwest College Learning Center Association. Available: ERIC Document Reproduction Service, ED 413 942
The Supplemental Instruction (SI) program at Anne Arundel Community College (Arnold, MD) was modified to use faculty members as SI supervisors. While this was the initial focus for the faculty members, the mentor role evolved into an opportunity for them to observe colleagues and to grow as teachers. Faculty mentors were placed in classes outside their own discipline. The classroom instructor and faculty mentor would meet periodically to provide feedback to each other and discuss strategies to improve instructional effectiveness.

Worthington, A., Hansen, J., Nightingale, J., & Vine, K. (1997, September). Supplemental Instruction in introductory economics: An evaluation of the University of New England's Peer Assisted Study Scheme (PASS). Australian Economic Papers, 69-80 Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA

This articles discusses the use of Peer Assisted Study Scheme (PASS) with approximately 300 students in an Introductory Microeconomics class at the University of New England (Australia) in 1995. PASS is an Australian contextualization of the Supplemental Instruction (SI) program. After an overview of peer collaborative learning and challenges with student learning in economics courses, the paper shares the results of qualitative and quantitative research. Quantitative data included assessment scores, the final exam results and the responses to a 34 item survey administered to all students in the class. The survey included questions about their experience in the PASS sessions, reasons they did or did not participate in PASS, usefulness of the tests, possible reasons for academic difficulty in the class, and to predict their final grade in the class. Data were analyzed using Item Response Theory and multiple linear regression techniques. Qualitative data were collected by the PASS coordinator from weekly written reports of the PASS facilitators, PASS session observations, and in-depth interviews. About one-third of the students participated in SI. Of these students, more than 50 percent attended more than half of the available sessions during the academic term. The PASS participants listed either "to improve understanding" or "to gain additional information" as the top reason for attending the sessions. Only five percent listed "to learn study skills" as the top reason. Only 22 percent of the nonparticipants said that they had no desire to attend or thought they were unnecessary. The most common reason not to attend related to insufficient time. It appears that the SI programs is directly beneficial to the SI participants and indirectly beneficial to non-SI participants since the program influenced the teaching staff to increase student learning. Before introduction of PASS, the failure rate in the course was 33 percent. Following the introduction of PASS, the failure rates have dropped to 18 percent. Through weekly feedback from the PASS facilitator, the class lecturer reported that he intentionally modified the lecture content and his lecturing style. One change was that the lecturer reduced the volume of information delivered so that more time could be spent on improving student understanding of critical concepts.

Worthington, A., Hansen, J., Nightingale, J., & Vine, K. (1995). Peer teaching and introductory economics: An application using the Peer Assisted Study Scheme (PASS) at the University of New England. Conference Proceedings of the Australian Economics Education Symposium in conjunction with the 24th Conference of Economists (pp. 22-38). Adelaide, South Australia, Australia: Australian Economics Education Symposium. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA

This paper discusses the use of Peer Assisted Study Scheme (PASS) with approximately 300 students in an Introductory Microeconomics class at the University of New England

(Australia) in 1995. PASS is an Australian contextualization of the Supplemental Instruction (SI) program. After an overview of peer collaborative learning and challenges with student learning in economics courses, the paper shares the results of qualitative and quantitative research. Quantitative data included assessment scores, the final exam results and the responses to a 34 item survey administered to all students in the class. The survey included questions about their experience in the PASS sessions, reasons they did or did not participate in PASS, usefulness of the tests, possible reasons for academic difficulty in the class, and to predict their final grade in the class. Data were analyzed using Item Response Theory and multiple linear regression techniques. Qualitative data were collected by the PASS coordinator from weekly written reports of the PASS facilitators, PASS session observations, and in-depth interviews. About one-third of the students participated in SI. Of these students, more than 50 percent attended more than half of the available sessions during the academic term. The PASS participants listed either "to improve understanding" or "to gain additional information" as the top reason for attending the sessions. Only five percent listed "to learn study skills" as the top reason. Only 22 percent of the nonparticipants said that they had no desire to attend or thought they were unnecessary. The most common reason not to attend related to insufficient time. It appears that the SI programs is directly beneficial to the SI participants and indirectly beneficial to non-SI participants since the program influenced the teaching staff to increase student learning. Before introduction of PASS, the failure rate in the course was 33 percent. Following the introduction of PASS, the failure rates have dropped to 18 percent. Through weekly feedback from the PASS facilitator, the class lecturer reported that he intentionally modified the lecture content and his lecturing style. One change was that the lecturer reduced the volume of information delivered so that more time could be spent on improving student understanding of critical concepts.

Yates, J., Gill, F., & Webb, C. (1995). Peer mentoring to facilitate learning in economics. In Australian Economics Education Symposium Proceedings: Addendum (pp. 40-56). Adelaide, South Australia, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This paper describes and provides a preliminary evaluation of Supplemental Instruction (SI) used at the University of Sydney (Australia) in an economics course during 1995. Three quarters of the SI leaders listed the following benefits of involvement with the program: improved teaching skills; improved leadership skills; increased confidence; and/or a change in the way they thought about economics.

Section Eight: Unpublished Manuscripts

Ahrens, R., George, B., Henderson, A., Marhinin, N., Power, D., Rae, M., Watters, J. J., & Ginns, I. S. (1996). Students helping students: Peer Assisted Study Sessions for students enrolled in a science content subject. Paper presented at the 2nd State Conference of HERDSA Inc., April 13-14, 1996, University of Southern Queensland, Toowoomba, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
The Peer Assisted Study Sessions (PASS) program, based upon the Supplemental Instruction (SI) program, was used at the Queensland University of Technology (Brisbane, Australia) in the Center for Mathematics and Science Education. Students enrolled in the Primary and Early Childhood area of a Bachelor of Education degree must take Science Foundations (MDB303) in their first year. The formal science backgrounds of many students enrolled in this class are inadequate. This study examined students enrolled in the class during 1995. The PASS group received higher final course grades (4.88 vs. 4.15, 0 to 7 scale) than the non-PASS participants. Qualitative research through student interviews and analysis of surveys suggested improvement gains for the PASS group as well.

Ainsworth, L., Garnett, D., Phelps, D., Shannon, S., & Ripperger-Suhler, K. (1994). Mathematics: Needs and approaches using Supplemental Instruction. Unpublished manuscript, Texas Tech University at Lubbock. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc. edu/ cad/si/sidocs/lamath94.htm
This paper discusses the implementation of Supplemental Instruction (SI) at Texas Tech University (Lubbock, TX) with courses in mathematics. After a review of the literature regarding the challenges with academic achievement for students in mathematics, the authors provide suggestions on how to successfully implement a SI program: focusing on problem-solving activities in the SI sessions that clearly illustrate the protocols to solve the problems rather than focusing just on finding the correct answer; providing more structure to SI sessions in math in comparison with SI sessions in other academic disciplines; and working on developing correct use of math vocabulary.

Andersson, A. (1996). Supplemental Instruction in Mechanics A. Unpublished manuscript, The Lund Institute of Technology at Lund, Sweden. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report describes the use of Supplemental Instruction (SI) in the Mechanics A course during spring of 1996 in the School of Mechanical Engineering at the Lund Institute of Technology (Sweden). The author was the SI leader for the course. The report provides a description of events that occurred during the SI sessions throughout the academic term. Suggestions from the SI leader included: be careful to schedule SI sessions at times of highest interest for the students; keep to time commitments when to start and

finish SI sessions since students may have other appointments following the sessions; divide the SI participants into smaller groups so maximize student discussions; and make sure that the SI leader has a plan before the beginning of the session to provide structure.

Arendale, D. (Ed.). (1999). Annotated Bibliography of Supplemental Instruction and Video-Based Supplemental Instruction. Unpublished manuscript, Center for Supplemental Instruction, University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/sibib97.htm
This annotated bibliography contains all known Supplemental Instruction and Video-based Supplemental Instruction documents and resources. It has more than 450 entries in the following categories: dissertations and thesis papers; books, chapters, and monographs; journal articles; audio and videotapes; newsletter articles; ERIC documents; published conference proceedings; unpublished manuscripts; Internet resources; newspaper and magazine press coverage.

Arendale, D. (1993). Fostering multicultural education with a learning assistance model that works: Supplemental Instruction. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/ damult93.htm
This paper describes the use of Supplemental Instruction (SI) to serve as a part of a campus multicultural education program. Since the primary focus of SI sessions is on the academic content, the sessions attract students of different ethnicities and cultures who share a common concern for improving their personal academic performance in the course. Cultural differences naturally emerge as students deal with the common academic task and they share their perspectives concerning the academic material from their personal and cultural point of view. The small group allows students to see a multiplicity of realities concerning the academic content. Some researchers argue that collaborative learning environments -- such as provided through SI sessions -- are more conducive for learning of students from diverse cultures. This is because some are field sensitive learners and find the traditional classroom environment of abstract learning unhelpful and find opportunity during SI sessions to make connections between the course material and their personal frame of reference. Included in the article is a research study directed by May Garland and partially funded by the National Association for Developmental Education. The study included 3 institutions across the U.S. regarding academic performance of students separated by ethnicity. Students of color participated at rates equal to or exceeded rates of White students in SI sessions. Students of color who participated in SI received mean higher final course grades than students of color who chose not to participate. The results were the same regardless whether the group was all students, top quartile, and bottom quartile.

Arendale, D. (1996). Frontloaded academic support: Supplemental Instruction in two-year colleges. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
http://www.umkc.edu/cad/si/sidocs/da2yr96.htm
This paper describes the role of Supplemental Instruction (SI) in providing academic support for new students in two-year colleges. Included are both interviews with campus SI Supervisors at two-year institutions across the U.S. and a data study of SI at 59 two-year public institutions that offered SI in 480 courses with an enrollment of 23,979 students. The data suggests that SI participants earn a final course grade that is half a letter grade higher than non-participants. In addition to examining the data in aggregate, similar findings occur when the data is separated by academic disciplines.

Arendale, D. (1999). Suggestions for improving attendance in Supplemental Instruction sessions. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
http://www.umkc.edu/cad/si/sidocs/umattn97.htm
This paper is a collection of suggestions developed at the University of Missouri-Kansas City and others in the field on how to increase attendance by students at Supplemental Instruction (SI) sessions. Because of the voluntary nature of SI attendance outside of course lectures, the issue of SI session attendance will be a continuing issue. A variety of factors can influence attendance. The paper provides 27 suggestions for: activities before the beginning of the term by the SI supervisor; activities by the course professor during the term; activities by the SI leader during the term; activities by the SI supervisor during the term; and activities by the SI supervisor after the academic term. It is critical that students see the relevance and connection between the activities that occur during SI sessions and what occurs during the professor's lectures.

Bartlett, G., Terblanche, N., & Eastmond, J. N. (1996). The politics and process of student involvement in a programme of Supplemental Instruction. Paper presented at the South African Association for Academic Development Conference, University of Fort Hare, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper recounts the steps (and missteps) taken in beginning an Supplemental Instruction (SI) program in two academic departments at Border Technikon (South Africa): Accounting and Management. It documents the steps taken to draw upon the resources of the Student Representative Council (SRC) in setting policy, selecting tutors, and maintaining the program's funding base. The authors advocate that SI program success is dependent upon a partnership with faculty and students sharing a stake in the outcomes. The SRC representatives advocated that all students should be eligible for consideration as SI leaders. Their view was that even academically weaker students could be helpful since they understood the challenges in the course and could help

others. Also, the SRC viewed SI as a service for students and that volunteers should be solicited. In both cases, the compromise was that all students were eligible for the SI leader position however it was felt that the SI leader should be compensated for the large time commitment required. Interviews with SI leaders suggested the following benefits: increased confidence with public speaking; more interaction with course faculty; development of teaching skills; and improved personal study strategies. Interviews with SI participants suggested improved: better understanding of course material; opportunity to practice academic skills; freedom to discuss material in the smaller, relaxed SI session environment; and higher test scores.

Botha, L., Van der Merwe, A., & De Klerk, E. (1996). Tutor programme vs. Supplemental Instruction at the University of Stellenbosch. Paper presented at the South African Association for Academic Development Conference, University of Fort Hare, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110. The Division of Academic Programmes (DADP) at the University of Stellenbosch (South Africa) runs academic development programs serving the twelve faculties of the University. Both a traditional tutor program and Supplemental Instruction (SI) was provided as support and enrichment for the students. At the time of this paper's publication, quantitative data was not available for summative evaluation and comparison of the two approaches to academic assistance. Interviews with students suggested high satisfaction with the SI program for several reasons: high motivation level of SI leaders; opportunity to work on writing effective summaries during SI sessions; developing understanding of basic concepts and subject specific terminology; development of study strategies; and improved skills for completing essay examination questions.

Boylan, H. R. (Ed.). (1996). An evaluation of the Texas Academic Skills Program (TASP). Unpublished manuscript, The National Center for Developmental Education, Boone, NC. Available: http://www.thecb.state.tx.us/divisions/univ/tasp/boylans/boynof.htm#top Under contract with the Texas Higher Education Coordinating Board (THECB), the National Center for Developmental Education conducted an extensive review of the Texas Academic Skills Program (TASP) from April through September of 1996. The site team of eight consultants conducted site visits to 20 Texas colleges and reviewed survey data from 96 institutions. The report provided recommendations for improvement of TASP. The team found that institutional procedures generally do not emphasize getting students through remediation as quickly and efficiently as possible. Instead, these procedures are designed to insure that students are engaged in continuous remediation until such time as they pass all sections of the TASP Test in compliance with state law. Recommendation #19 recommends that Texas institutions establish timely completion of remediation as a priority and they document specific efforts undertaken to reduce the amount of time TASP students spend in remediation. A noncourse program that can help achieve the aforementioned objective is discussed in

Recommendation #20. That recommendation states that Texas institutions which have not done so already consider adoption of Supplemental Instruction (SI) to help students succeed in historically difficult courses that are often encountered in the first year curriculum. This noncourse academic support program could assist a number of students without the need for enrollment in remedial courses.

Boylan, H. R., Bonham, B. S., & Bliss, L. B. (1992). National study of developmental education: Students, programs and institutions of higher education. Unpublished manuscript, Boone, NC: National Center for Developmental Education.

Through a grant from the EXXON Education Foundation, the National Center for Developmental Education conducted the most extensive study of developmental education. The 1989 to 1992 study included 116 institutions representing a wide diversity of types. More than 6,000 students were subjects of the longitudinal study. The purpose of the study was to determine what is actually done in developmental education, to explore whether or not developmental programs actually contribute to student success, and, if so, to identify what types of programs and services have the greatest impact upon student success. Among the list of instructional factors related to student success, Supplemental Instruction (SI) is one of the items. Other items listed were: mastery level performance, frequent testing, immediate feedback, required remediation, individualized instruction, lab activities, integrated teaching of critical thinking skills, and close proximity of classrooms and support services.

Brazelton, W., Schmidtlein, P., & Baugher, M. (1981, October). Reducing student attrition in the first-year economics course through skill-based Supplemental Instruction. Paper presented at the University of Missouri Economics Conference, Columbia, MO. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.

This paper discusses the use of Supplemental Instruction (SI) to improve student academic performance in introductory college-level economics courses at the University of Missouri-Kansas City. Data suggests that SI participants receive higher mean final course grades (66.6% A and B final course grades for SI participants vs. 45.6% for non-SI participants) and a lower rate of D, F or course withdrawals (14.8% vs. 21.1%). The total percent of unsuccessful enrollments (D, F or course withdrawal) for the course was reduced from 34 percent before the introduction of SI to 19 percent during the second year that SI was offered to the students in the course.

Christie, R., & Cheah, S. (1995). Support structures for students in information technology at Queensland University of Technology. Unpublished manuscript, Queensland University of Technology at Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.

This paper describes the use of Supplemental Instruction (SI) at the Queensland University of Technology (Australia) in information technology courses. Based on qualitative research studies, the following results occurred: 1) SI participants: were appreciative of opportunity to share their academic problems and doubts with someone who had successfully completed the course; 2) SI leaders: improved their skills in leadership, interpersonal communication, problem solving, study and time management; and 3) course instructors: improved their teaching by receiving timely feedback from the students. There was a positive correlation between higher levels of SI attendance and receiving high marks (6 or 7) in the course.

Clark, C. (1997). Report by the National Centre for Supplemental Instruction Southern Africa at the University of Port Elizabeth fro the Department of Academic Development at the University of Missouri-Kansas City. Unpublished Manuscript, University of Port Elizabeth, Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes results from the 1997 Supplemental Instruction (SI) national South Africa survey. Currently 53 tertiary institutions comprising more than 140 faculty and staff members have been trained in use of SI by the Southern African Center for SI based at the University of Port Elizabeth (UPE) in the Republic of South Africa. Continuing technical assistance and professional development workshops are offered by the National Center at UPE for institutions with SI programs.

Clark, C., & Brophy, B. (1995). Student perceptions of the Supplemental Instruction (SI) programme at the University of Port Elizabeth. Paper presented at the South African Association for Academic Development Conference, Technikon Free State, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at the University of Port Elizabeth (South Africa). A questionnaire investiaged the attitudes of: attenders and non-attenders, regular and irregular attenders, prepared and underprepared students, humanities and science students, and finally, pass and failures. This paper focuses on prepared and underprepared students. The underprepared students often only attended SI when they had problems in the course. As a group that studied by themselves. The more prepared students found the SI sessions useful due to the use of collaborative learning techniques.

Clark, C., & Mallon, P. (1998). Supplemental Instruction as a tool to improve student success at South African tertiary institutions. Unpublished manuscript, University of Port Elizabeth, Port Elizabeth, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This unpublished manuscript describes the use of Supplemental Instruction (SI) with students at the University of Port Elizabeth (UPE) and other institutions in the Republic of South Africa. UPE was selected by UMKC to serve as the training and technical

assistance center for Africa. To date national workshops have been conducted 14 times with 140 faculty and staff members from 53 tertiary institutions in South Africa. This paper describes the historical development of SI with Historic Black Universities, Historic White Universities, and Technikons/Colleges. Often the SI program is located within the academic development unit. It is common that SI programs have been introduced to redress inequalities in academic preparation by the newly admitted students from widely diverse ethnic backgrounds and academic preparation levels.

Congos, D. H. (1997). Supplemental Instruction models for introductory chemistry and physics. Manuscript submitted for publication, Central Piedmont Community College at Charlotte, NC. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/ dcphys97.htm
This paper provides several models for Supplemental Instruction (SI) leaders to use when facilitating sessions in introductory chemistry and physics courses. Problem-solving activities are essential for students enrolled in these courses since many of them are unable to recognize problem patterns and the needed procedures to solve them. In chemistry the following seven steps often are needed: 1) read the problem; 2) rewrite the problem in students' own words; 3) write down what the student is trying to find; 4) list the tools that are given for solving the problem; 5) do factor labeling; 6) check the answer in the book for correctness; 7) if the students' answer is incorrect, return to step #3.

Couchman, J. (1997). Report on the pilot study of the Supplemental Instruction program: 51002 Introduction to Accounting. Unpublished manuscript, University of Southern Queensland, Toowoomba, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
A 1997 research study at the University of Southern Queensland (Toowoomba, Queensland, Australia) involved all enrolled students in Introduction to Accounting (51002). By use of the external student cohort as a control group, it was claimed by the researchers that Supplemental Instruction resulted in a positive impact on the overall pass rate for the unit, raising it from 39% in 1996 to 55% in 1997. SI participants averaged 1.15 of a grade point higher on a 7 GPA scale than non-participants. SI participants were: only one-third as likely to fail; nearly four times more likely to gain an HD, approximately equally likely to gain an A grade; over twice as likely to gain a B grade; and three-quarters as likely to gain a C grade than non-participants. When examining a subpopulation of international students, they had a 78% pass rate compared with 48% for those international students who did not participate.

Couchman, J., & Pigozzo, R. (1997). Report on the Supplemental Instruction program: 51008 Economics. Toowoomba, Queensland, Australia: Unpublished manuscript, University of Southern Queensland. Available: Center for Supplemental Instruction,

University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This 1997 Supplemental Instruction (SI) study was conducted at the University of Southern Queensland (Toowoomba, Queensland, Australia) in the 51008 Economics course. SI participants averaged 0.83 of a grade point higher on a 7 GPA scale than non-participants. The results suggested that only one-fifth of SI participants were likely to fail; one-third more likely to gain an HD, two and a half times more likely to gain an A grade; twice as likely to gain a B grade; and over one and a half times as likely to gain a C grade than non-participants. International students who attended SI sessions regularly had a 93% pass rate compared with 63% for those international students who chose not to attend regularly.

Davies, E., & Vorster, J. (1994). The SI leader as a teaching resource. Paper presented at the South African Association for Academic Development Conference, University of Natal, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
In 1994 a Supplemental Instruction (SI) program was introduced in the Law Faculty at Rhodes University (South Africa). Two courses were initially selected for a pilot program: Legal Theory I and Commercial Law I with joint funding from the Academic Development Program and the Law School. Interviews with students suggested that the SI leader empowered the students to be more active in their own learning process and take additional responsibility for mastery of content mastery rather than being passive in the classroom. The SI activities were more student controlled while the formal tutorial program was viewed as more rigid and prescriptive.

Emal, C., Johnson, T., & Kelter, P. B. (1997). Supplemental Instruction: A model program that goes against the grain. Manuscript submitted for publication, University of Nebraska at Lincoln. Available: http://yaduh.unl.edu/si.htm
This report examines the use of Supplemental Instruction (SI) at the University of Nebraska (Lincoln, NE). After an initial overview of the SI model, the paper reports on a study of the use of SI in multiple sections of Chemistry 109 (1,100 to 1,300 students total) over a period of five academic terms (Fall 1994 through Fall 1996). The SI participants earned a mean final course grade of 2.70 vs. 2.12 for the nonparticipants. The SI participants received a much lower rate of D, F and withdrawal grades (17.2 percent) when compared with the nonparticipants (42.9 percent). There was a positive correlation between increased attendance at SI sessions with higher mean final course grades. A further analysis of students was accomplished by dividing them into quartile groups on the basis of their standardized college entrance scores (ACT). Whether it was the top (3.18 vs. 2.53), bottom (1.97 vs. 1.68) or middle quartile groups (2.60 vs. 2.04) the SI participants received approximately a mean final course grade that was half a letter grade higher It appears that SI was equally attractive to all students since approximately the same percent of students attended SI from each of the quartile groups (18 to 20 percent).

Frans, P. (1997). The development of Supplemental Instruction facilitators as skilled and confident leaders. Paper presented at the South African Association for Academic Development Conference, Broederstroom, Republic of South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper describes the use of Supplemental Instruction (SI) at Vista University-Mamelodi Campus (South Africa). In addition to fulfilling traditional SI program objectives, additional ones were a focus of this contextualization: providing feedback to the lecturer concerning student comprehension, thereby providing an opportunity to revise content delivery; give opportunity for students to use their first language rather than having all conversation occur in English; providing another venue for faculty development; and ensuring that all stakeholders -- students, course lecturer, SI Supervisor, and SI leaders -- work together to evaluate the SI program.

Frans, P. (1998). Evaluation of the Supplemental Instruction (SI) programme implemented at a historically disadvantaged university. Paper presented at the South African Association for Academic Development Conference, Bloemfontein, Republic of South Africa.

Gardiner, R. (1997). Comparison of costs and financial benefits of a Supplemental Instruction program. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. For further information please contact: Emeritus Professor R B Gardiner, Ph.D., SI/PASS Program Coordinator, Queensland University of Technology, GPO Box 2434 , Brisbane 4001, Australia, Tel: +61 (0)7 3864 2927, Fax: +61 (0)7 3864 1815, E-mail: rb.gardiner@qut.edu.au.
This paper describes the benefits of the Supplemental Instruction (SI) program in terms of educational outcomes and financial benefits. The costs and benefits are based on implementation at higher educational institutions in Australia. Based on higher reenrollment rates of SI participants, the SI program increases revenue through savings from lost student fees and tuition. Preliminary data from Queensland University of Technology in Civil Engineering suggest an increase in 15 percentage points for reenrollment of SI participants. However, the financial equation model described in this paper is very conservative and only estimates a difference of 5 percentage points.

Garland, M., & Gordy, K. (1987). Supplemental Instruction in the context of critical thinking. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
http://www.umkc.edu/cad/si/sidocs/mgctth89.htm
This manuscript describes how the Supplemental Instruction program can be used to promote critical thinking skills of students. This goal is supported through SI session activities. Independent thought is fostered through session strategies that require students to work privately before group discussions are facilitated. Creating a learning

environment in SI sessions where students feel comfortable to talk promotes active learning and vocalizing of ideas. A third component needed by critical thinking proponents is "reflection" when students begin to understand their own thinking processes. SI sessions focus not only on the course content, but also on the process of learning and thinking about it. The SI leader vocalizes when they are thinking about as they consider the material and solving the problems. SI participants are also encouraged to vocalize their thinking process and their uncertainties as well.

Ginns, I. S., & Watters, J. J. (1995). Final Report of Peer Assisted Study Sessions in Science Foundations MDB303. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This report describes the use of Peer Assisted Study Sessions (PASS) with students at Queensland University of Technology (Brisbane, Queensland, Australia). PASS is the term used at the institution for Supplemental Instruction (SI). Students enrolled in the Primary and Early Childhood strands of the preservice Bachelor of Education program are required to undertake basic studies of science in their first year. This core unit (Science Foundations - MDB303) was the course proposed for PASS. The performance of the students were examined on a 1 to 7 scale (1 to 3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). The PASS group earned a statistically significant ($p < .01$) higher mean final course grade of 4.88 as compared with 4.15 for the non-participants. No PASS participants earned a failing grade while 8 of the non-participants did so. The PASS group earned grades of distinction or high distinction 66 percent of the time compared with 28 percent for the non-participants. Interviews with PASS participants identified the following changes: more thorough understanding of scientific concepts; identified ways of engaging the course content; study methods improved; established more consistent study times; attitudes towards science improved; and overall confidence increased. PASS leaders mentioned the following changes for themselves: increased confidence in teaching skills; enjoyed working in groups.

Gordy, Z. K., & Garland, M. (1987). Improving college-level thinking through Supplemental Instruction. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/mgthin89.htm
The authors describe the use of Supplemental Instruction (SI) to increase the level of thinking by college students. Since SI sessions incorporate a reflective approach to learning, the SI leader creates an environment for students to increase their level of critical thinking. Not only do the SI sessions focus on review of course content, but also through active discussions, students become more aware of their own thinking process.

Heerspink, J. B. (1997). The use of spatial representation in history courses and in courses with historical content. Unpublished manuscript, Calvin College at Grand Rapids, MI. Available: http://www.umkc.edu/cad/si/sidocs/jhhist94.htm
Students who learn to represent historical information spatially will find their learning to be both more complete and more efficient. The Supplemental Instruction (SI) leader has a significant role to play in bringing experience in learning history and in the use of learning strategies in the SI sessions. Five typical spatial representation patterns of learning in history courses include: sequence, parts/types/lists, compare/contrast, cause and effect, PERSIA (political, economic, religious, social, intellectual, and/or artistic factors). The author is the tutor coordinator at Calvin College (Grand Rapids, MI).

Irwin, D., & Risser, B. (1988). Supplemental Instruction-Plus: Levels of academic support at the community college. Unpublished manuscript, Onondaga Community College at Syracuse, NY. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/ sidocs/brplus92.htmTraditional support programs at community colleges focus a great deal of attention on meeting the needs of developmental students. Supplemental Instruction PLUS (SI+) builds on that model to provide several levels of academic support all students as they are challenged. SI+ was developed at Onondaga Community College in Syracuse, NY and is a variation of the traditional SI program. However, SI+ groups have a slightly different focus since SI+ is meant to help students adjust to the demands of college courses after they have completed a sequence of developmental courses. The courses targeted by SI+ are not historically difficult and requiring the intensity of a full SI program. While the study sessions appear similar to traditional SI, SI+ leaders do not attend the course professors lectures. The SI+ leader still models effective study behavior. To keep pace with the course, the SI+ leader meets weekly with the course professor. It is anticipated that students will participate in traditional SI program when they encounter historically difficult courses in succeeding academic terms. The final stage for the SI+ program is for students to create independent study groups in other courses where SI+ and traditional SI sessions are not offered.

Kelly, B. A. (1991). Selection of leaders to facilitate Peer Assisted Study Sessions (PASS). Unpublished manuscript, University of Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This article describes the selection procedures for Peer Assisted Study Sessions (PASS) leaders. PASS is a locally used name at Queensland Institute of Technology and the University of Queensland in Australia for the Supplemental Instruction (SI) program. Several suggestions include distributing leaflets and encouraging former PASS participants to apply as leaders. Group interviews are used to same time and to make students feel more at ease during the interview process. To meet the need for the program to fit the institutions use of Total Quality Management (TQM), PASS leaders

were asked to complete a questionnaire at the end of their PASS sessions and to maintain a diary of session activities. This information was used to improved the PASS program and provide helpful feedback to the course instructors.

Kelly, B. A. (1992). And it came to PASS: Peer Assisted Study Sessions. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper discusses the development of the Peer Assisted Study Sessions (PASS) program at Queensland University of Technology (Brisbane, Australia). PASS is based upon the Supplemental Instruction (SI) model. The program was piloted in two classes in Anatomy for Nursing and Statistics for Information Technology. Research results indicated a lower rate of withdrawal and higher final course grades for participants.

Kelly, B. A., & Gardiner, R. (1994). Student peer mentoring: An effective strategy to promote student learning. Paper presented at the HERDSA Annual Conference, July 6-10, 1994, 1996:
The Peer Assisted Study Sessions (PASS) program is based upon the Supplemental Instruction (SI) program developed in the U.S. PASS was used at the Queensland University of Technology (Brisbane, Australia). A pilot program was carried out in 1992. Since then, the SI program has spread to seven disciplines in five faculties, and has attracted four 1994 CAUT grants.

Kelter, P. B., & Carr, J. D. (1996). Personalizing the large general chemistry lecture experience. Unpublished manuscript, The University of Nebraska at Lincoln. Available: http://wwitch.unl.edu/kelter/paulpap.html
This report that includes information about the use of Supplemental Instruction (SI) was published online in connection with New Initiatives in Chemical Education, an on-line symposium, June 3 to July 19, 1996. SI was selected since it helps to provide a support structure to help individuals in the large class sections of Chemistry 109 and 110. Data from Fall 1995 showed that SI participants received a higher final course grade (2.80 vs. 1.99), a higher rate of A and B final course grades (53.1% vs. 34.9%), a lower rate of D and F final course grades (13.6% vs. 39.4%). Data suggests what when students are classified on the basis of ACT quartile scores, those who participated in the SI sessions receive a considerably higher grade in Chem 109 that those who did not if they had higher ACT scores (top quartile: SI, 3.18 vs. 2.53 non-SI; middle two quartiles: 2.60 vs. 2.04; bottom quartile: 1.97 vs. 1.68).

Kenney, P. A. (1990, April). Effects of Supplemental Instruction on student performance in a college-level mathematics course: A report of additional results. Paper presented at the 1990 Annual Meeting of the American Educational Research Association, Boston, MA. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper details additional results from an experiment on the effects of Supplemental

Instruction (SI) on student performance in a college business calculus course. The paper is a continuation of research first reported at the 1989 AERA Annual Meeting. SI participants who withdrew from the course most often cited their perceived lack of prerequisite skills or to problems with calculus concepts. The author postulates that the exposure to SI raised their awareness of their lack of skills. Non-SI participants who withdrew from the course most often cited "personal" reasons. Of the 26 students who failed or withdrew from the original calculus course, former SI participants were more likely to immediately reenroll in the course (six students) than the non-SI participants (one student). Another study focused on the academic performance of SI and non-SI participants in a succeeding academic term in courses where SI was not offered. Former SI participants earned no F grades or withdrew from the second-semester business calculus course. The former SI participants earned a slightly higher mean final course grade (2.63 vs. 2.48), though it was not a statistically significant difference. The author speculates that the absence of SI with the second calculus course may had a bigger impact on former SI participants -- narrowing the positive difference in academic achievement with the control group -- since a support service which they were used to accessing was not available in the next course in the sequence.

Kenney, P. A. (1990). Suggestions for mathematics Supplemental Instruction sessions. Unpublished manuscript, Pennsylvania State University at College Park. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
http://www.umkc.edu/cad/si/sidocs/pkmth197.htm
This paper was developed to accompany a videotape that provides suggestions for strategies to use during Supplemental Instruction (SI) sessions. These suggestions are based upon direct experience while serving as a SI leader in a calculus course at the University of Texas at Austin while she was completing here Ph.D. on the effectiveness of SI. Some of the suggestions included: constantly referring to the course syllabus throughout the academic term; discussing effective note taking in math classes by the SI leader sharing their strategy; discussing ways to maximize the usefulness of the textbook; providing additional structure to the SI sessions; focuses on the problem-solving protocols rather than on just finding correct answers; SI leader providing worksheets to guide SI sessions that help generate group discussion, focus on key concepts, help review for exams, and practice problem-solving skills; test question prediction; and taking practice exams to prepare for in class examinations.

Kenney, P. A. (1997). Supplemental Instruction in mathematics: Needs and approaches, critical aspects of mathematics training and the role of SI. Unpublished manuscript, Pennsylvania State University at College Park. Available:
http://www.umkc.edu/cad/si/sidocs/pkmath93.htm
Mathematics presents a challenge to many students in higher education. This paper describes some of these challenges and two approaches to Supplemental Instruction (SI) that may help students. Critical components of math SI sessions: 1) a welcome period

during which the glossary terms and protocols are discussed; 2) a period during which students use the protocols to solve problems similar to the homework; and 3) a period during which students may attempt some homework problems.

Kenney, P. A., & Kallison, J. M. (1992). Learning to study college-level mathematics: Effects of a Supplemental Instruction (SI) program in first-semester calculus courses. Paper presented at the American Educational Research Association 1992 Annual Conference, San Francisco, CA. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper details results from a Supplemental Instruction program designed for students in college-level calculus courses during Fall 1989. The studies were conducted at the University of Texas at Austin by two teaching assistants employed by the mathematics department and were selected and trained by the SI program by the staff of the University's Learning Skills Center. The first study compared the performance of students in Business Calculus. While SI was beneficial to all SI participants (2.39 vs. 1.96 for non-SI participants), it was especially helpful for lower-ability students. The second study focused on an Engineering Calculus course. While the difference was closer for the two groups (2.01 vs. 1.91 for non-SI participants), SI provided disproportionate help to the lower-ability students as measured by SAT quantitative scores. More than 70 percent of students felt that the study strategies introduced by the SI leaders were either "very helpful" or "helpful." Almost 80 percent indicated that exposure to study strategies for calculus changed the way they studied either "very much" or "somewhat," and that the techniques that these skills would help them in future courses either "very much" or "somewhat." More than 80 percent of the students responded that it was either "very important" or "important" that all SI leaders incorporate study strategies into discussion sections. SI leaders mentioned the positive impact of the SI program on themselves as well: reflect about their teaching methods; develop new teaching methods; and learned how to integrate learning strategies with content instruction.

Kernick, G., Kedian, J., Seneque, M., & Louw, R. (1993). Supplemental Instruction: Toward a conceptual framework. Paper presented at the South African Association for Academic Development Annual Conference, University of the Western Cape, South Africa. Many academic leaders at postsecondary institutions in South Africa report that many students lack the necessary skills to become successful autonomous learners. Supplemental Instruction (SI) is being used to help students develop these skills outside of class since the traditional passive lecture-based educational delivery system will be slow to change. SI is differentiated from traditional tutorial sessions since in SI it is learner-controlled.

Koch, E., & Snyders, M. (1997). The effect of Video Supplemental Instruction on the academic performance in mathematics of disadvantaged students. Unpublished

manuscript, University of Port Elizabeth, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper examines the effect of Video-based Supplemental Instruction (VSI) on the mathematics performance of students whose matric marks did not enable them to be directly admitted to the Science Faculty at the University Port Elizabeth (South Africa). These students were enrolled in Ethembeni Community College in Port Elizabeth which serves as a preparation area before admission to UPE. Fifteen students who enrolled in VSI math were matched with 14 students enrolled in a similar math course that required attendance at Supplemental Instruction (SI) sessions. Research suggests that VSI was a more useful instructional delivery system for students with a minimum level of pre-knowledge in mathematics and who study in a consistent and responsible manner. In addition, the researchers suggested the usefulness of VSI in distance learning venues where experienced and trained faculty members are unavailable to deliver live instruction.

Koch, E., & Snyders, M. (1998). The effect of Video Supplemental Instruciton on performance in mathematics in the second semester mathematics special course. Unpublished manuscript, University of Port Elizabeth, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110.
This paper examines the effect of Video-based Supplemental Instruction (VSI) in the second semester mathematics course which enrolled students from Ethembeni Community College in Port Elizabeth which serves as a preparation before admission to the University of Port Elizabeth (South Africa). Students who enrolled in VSI math were matched with students enrolled in a similar math course that required attendance at Supplemental Instruction (SI) sessions. Research suggests that VSI was a more useful instructional delivery system for students with a minimum level of pre-knowledge in mathematics and who study in a consistent and responsible manner.

Loh, H. (1992). Peer Assisted Study Sessions for LSB181, Anatomy for the Nursing Students, 1992. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report discusses the use of Supplemental Instruction (SI), which is called Peer Assisted Study Sessions (PASS) at the local institution with nursing students enrolled in a anatomy course. Approximately half the students attended the SI sessions during the academic term. The program reduced the failure rate of students (7.8% vs. 19.1%), increased the percent of students receiving high marks (5, 6 or 7 on a scale of 0-7), and improved the mode and mean final course grade.

Loh, H. (1997). Multidisciplinary peer collaborative study programs for first year Aboriginal and Torres Strait Islander students. Unpublished manuscript, Queensland University of Technology at Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report describes the use in 1995 of Supplemental Instruction (SI) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander (A&TSI) students. Many of these students began postsecondary education with high anxiety (79% student response), low to medium confidence in passing their courses, limited knowledge of study skills, and high to moderate difficulty levels within their respective subjects. A&TSI students had an attrition rate nearly double other students at QUT (32.7% vs. 18.4%). About half the A&TSI students participated in the SI program. Using a four point scale (greatly, moderately, slightly, not at all), data obtained from end of academic term student surveys of SI participants suggests that SI: was helpful for increased learning (70% of students selected "greatly"), lowered anxiety levels (45% greatly and 45% moderately), increased confidence levels (50% greatly, 50% moderately), improved enthusiasm and motivation to perform better (45% greatly, 45% moderately), and helped to create a favorable environment supporting learning (100% greatly). SI participant grades were evaluated on a seven point scale: fail, one to three; pass, 4; credit, 5; distinction, 6; high distinction, 7. When analyzing the grade distribution for all A&TSI students, 22.9% of SI participants earned grades of 6 or 7 as compared with 0% for the non-SI. When examining the failing grades (1, 2 or 3) the SI group had a dramatically lower rate (22.8%) when compared with the non-SI group (78.3%). SI leaders reported that their participation in the program led to the following outcomes: developed facilitation and group organizational skills; improved confidence and self esteem; and developed their own learning skills.

Loh, H., & Kelly, B. A. (1994). Supplemental Instruction (SI) in anatomy for first year nursing students. Unpublished manuscript, The Queensland University of Technology, Brisbane, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This paper describes the use of Supplemental Instruction (SI) since 1992 with nursing students at the Queensland University of Technology (Australia) in an anatomy course (LSB 181). At QUT, SI is known as PASS (Peer Assisted Study Sessions). The SI modeled was contextualized in several ways: two SI leaders facilitated each group, allowing for larger numbers to attend each SI session; principles of Total Quality Management were employed to use SI as a feedback loop between the students and the lecturer, thereby providing data to the instructor to allow for immediate changes in the content and delivery. Data from 1992 through 1995 suggest substantial benefits of the SI program to students, SI leaders and the course instructor. The performance of the students were examined on a 3 to 7 scale (3=fail, 4=pass, 5=credit, 6=distinction, 7=high distinction). SI participant interviews and 1995 survey data suggested agreement with the following statements regarding the impact of SI: increased confidence levels

(87.0%), lowered anxiety levels (61.5%), higher motivation to achieve grades of distinction (84.6%), and developed new study skills (70.3%). Based on data from 1992 in the anatomy course, the SI participants achieved significantly ($p < .01$) higher levels of academic achievement. In comparison with non-SI participants, there were more grades of level 6 or 7 (39% vs. 27%) and less grades of level 3 (10% vs. 25%). When comparing failure rates, the results favored the SI participants. SI participants in 1995 failed the class at a rate of 2.7% while the non-SI group failed the class at a higher rate of 13.3%. To investigate the possible impact of student motivation, the failure rate of students who desired to participate in SI but were unable to attend due to time conflicts failed at nearly the same rate (12.7%) as the entire non-SI group (13.3%). This appears to support the conclusion that student motivation was not the major variable impacting student academic performance. The overall class average (including all SI and non-SI participants) for grades of level 3 (failure) were reduced from 22.8% before the introduction of SI down to 7.1% after the fourth year of SI. SI leaders reported the following positive results: developed leadership skills; improved their facilitation skills; improved their study skills; acquired group management skills; and increased their own confidence and self esteem. Instructors who had SI attached to their course reported the following positive results: rapid dissemination of information and instructions to the SI participants; provided benefits of small group instruction within the large lecture sections ($n = 400$); instructors received feedback from students which allowed them to "fine-tune" teaching and improve teaching performance; involvement with the SI program provided new avenues for grants; enhancement of curriculum vitae; and improved positive attitude and sense of achievement since students improved academic performance.

Loy, W., Crown, K., & Wessley, A. (1996). Academic support service as a means for professional development. St. Louis, MO: St. Louis Community College at Meramec. Available: http://www.wvmccd.cc.ca.us/mc/esl/fac/chan/NISOD/AcadSupport.html
This paper describes the use of Supplemental Instruction (SI) as serving both the purpose of providing academic support to students while providing a venue for faculty professional development. The authors presented the paper at the 1996 NISOD conference. During the process of instituting SI, faculty re-familiarize themselves with good student qualities. Faculty learn about collaboratively learning and study strategies that often can be incorporated into classroom. Faculty learn more about curriculum development and learning experiences. The instructor receives continual assessment and feedback through the SI program.

Martin, D. C., & Arendale, D. (1997). Mainstreaming of developmental education: Supplemental Instruction and Video-based Supplemental Instruction. Unpublished Manuscript, The University of Missouri-Kansas City. Available: http://www.umkc.edu/cad/si/sidocs/sivsi97.htm.
This paper describes the development of Supplemental Instruction (SI) and Video-based Supplemental Instruction (VSI) to serve an effective way to mainstream the best features

of developmental education into traditional college-level courses. The historical development and modern day implementation of both programs are described.

Martin, D. C., & Arendale, D. (1997). Video-based Supplemental Instruction: Interactive video courses. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/vsianprt.htm
This report reviews the Video-based Supplemental Instruction (VSI) program initiated at the University of Missouri-Kansas City. The report provides a descriptive overview of VSI as well as numerous data studies concerning its use with high school and college students. Data studies suggest that among college students the VSI participants receive higher final course grades and reenroll at higher rates than the non-participants. VSI at the college level is targeted for students who have a history of academic difficulty (e.g., probation or dismissal) and have lower academic predictors (e.g., lower standardized entrance scores, lower high school percentile rank). As measured by the Learning and Study Strategies Inventory (LASSI), VSI participants show positive gains at the end of the academic term. Data studies of high school students who enroll in VSI courses suggest that they earn higher mean final course grades than college students who do not participate in VSI but enroll in the live section of the same class.

Martin, D. C., DeBuhr, L., & Garland, M. (1987, January 4). Developing critical thinking skills of college students through Supplemental Instruction. Paper presented at the Third International Conference on Thinking, Honolulu, HI. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
The authors describe the use of Supplemental Instruction (SI) for improving the critical thinking skills of students. Some SI session activities help foster improved thinking skills: modeling of thinking processes by the SI leader; probing questions; redirective and higher levels of questioning; facilitating student discussions of their thought processes; escalation of discussions from concrete to abstract levels; and precise use of content vocabulary.

McGlone, F. D. (1994). A training and implementation program for first year student peer mentors. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
The Queensland University of Technology (QUT) Faculty of Law (Brisbane, Australia) Supplemental Instruction (SI) program encouraged students to: develop deep approaches to learning, develop generic learning skills, and increase student autonomy while encouraging them to work and learn cooperatively with others. The SI program operates in two classes: Torts and Contracts with class sizes exceeding 350. In addition to improving academic performance of student participants, the SI leaders reported

enhanced communication and interpersonal skills which they perceived to increase their job marketability.

Moore, I. (1992). Undergraduate students as assistant demonstrators in the first year physics laboratory. (Report No. 27). Unpublished manuscript, Queensland University of Technology, School of Physics, Brisbane, Queensland, Australia: Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of a modified Supplemental Instruction (SI) program in the School of Physics at Queensland University of Technology (Brisbane, Australia). The pilot project used second and third year physics major students as assistant demonstrators in the first year physics laboratory. In addition to improvement by the students in the class, the assistant demonstrators also showed improvements in their class performance. Through qualitative research, it appears that the assistant demonstrators helped students to improve their own learning process, focus on the process rather than rushing to complete the task, and think of new issues and questions.

Murray, M. H. (1995). Report on Peer Assisted Study Sessions in Engineering Mechanics 2. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, Kansas City, MO 64110 USA.
This report discusses the use of Peer Assisted Study Sessions (PASS), the local institutional term for the Supplemental Instruction (SI) program used at Queensland University of Technology (Brisbane, Queensland, Australia) in CEB185, Engineering Mechanics 2. PASS participants earned higher mean final course grades (3.6 vs. 2.8 on a 0 to 7 scale). The most significant change in grades was in improving the performance of students who previously were projected to earn low grades and see them now achieve final grades in the mid range. PASS participants mentioned the following reasons for attending the sessions: working on past exam and test solutions; discussion of problems; being able to ask questions freely and not look stupid; realizing there were different ways to tackle a problem; and interaction with fellow students and leaders who had recently done well in the course.

Murray, M. H., Grady, J., & Perrett, S. (1997). Students managing students' learning. Paper presented at the 9th Annual Conference of the Australian Association of Engineering Education, December 14-17, 1997. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of Supplemental Instruction (SI) at Queensland University of Technology (Brisbane, Australia) in engineering classes (Engineering Mechanics I and II). Student participant comments said that participation in SI sessions: developed greater understanding, more helpful than tutorials, made discussions more enjoyable, developed greater confidence, enjoyed group work, and found the atmosphere more

relaxed and helpful. SI leaders mentioned the following benefits for themselves: reinforced own learning and study skills, developed more confidence, made academic coursework more challenging and satisfying.

Nel, P. P. C., Beylefeld, A. A., & Nel, M. M. (1997). Video-based Supplemental Instruction as an integral part of an academic support and development program. Unpublished manuscript, University of the Orange Free State at Bloemfontein, South Africa. Available: http://www.umkc.edu/cad/si/sidocs/pnvsis97.htm
Video-based Supplemental Instruction (VSI) is being used at the University of the Orange Free State (Bloemfontein, South Africa) for academic development and parallel-medium instruction. The paper provides an overview of the VSI program. A study was conducted in the Department of Anatomy and Cell Morphology, Faculty of Medicine with nursing students enrolled for a course in this department. Many of these nursing students are from educationally deprived backgrounds. Data suggests that VSI participants performed at the same level, or higher, than students who do not come from an educationally deprived background.

Phillips, K. (1995). Supplemental Instruction in Australia. Unpublished manuscript, The University of Missouri-Kansas City.
This report records the observations by a staff member from the National Center for Supplemental Instruction (SI) located in Kansas City, MO during her professional development leave in Australia in the first half of 1997. The author records her observations concerning the SI programs operating at Queensland University of Technology, University of Southern Queensland, and the University of Western Sydney-Nepean. Some of the adaptations of the SI model frequently used with Australian higher education include: use of multiple SI leaders in a single class, SI leaders work in pairs during SI sessions, and the SI program is usually decentralized on campus. Often the course lecturer selects, hires, trains, evaluates, and supervises the SI leader. This administrative procedure encourages higher involvement of the lecturer in the SI program. A drawback mentioned by the author is that this responsibility is added due to heavy work demands placed upon the lecturer for other responsibilities. There is continuing discussion with Australian educators regarding the strengths and challenges with a decentralized SI administrative structure.

Rand, P. (1994). Video Based Tutorial System for first year nursing students. Unpublished manuscript, The University of the Orange Free State, South Africa. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of Video-based Supplemental Instruction (VSI) with nursing students at the University of the Orange Free State in South Africa during 1994. The VSI program was implemented to assist nursing students who were severely academically underprepared. The author reports high satisfaction with the program

since low grades were decreased and higher grades were increased in comparison with academic terms that did not have VSI offered.

Ross, T. (1995). Report on Peer Assisted Study Sessions conducted in visual arts, second semester 1995: AASB726, Introduction to Art History. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report discusses the use of Peer Assisted Study Sessions (PASS), the local institutional name for the Supplemental Instruction (SI) program with students enrolled in an Introduction to Art History course (AAB726). For several reasons, the grades of PASS and non-PASS students were nearly the same. The author suggests that part of the difficulty for the PASS program was that the PASS leaders did not attend class along with the other students. The course curriculum had undergone a signficant change between when the PASS leaders attended the same class and when they attempted to provide academic assistance to the students. However, surveys found that PASS leaders found the experience very helpful: improved interpersonal skills (100%); improved learning skills (100%); developed facilitating skills (100%); and developed leadership skills (100%).

Sandmann, B. J., & Kelly, B. K. W. (1979). Effect of Supplemental Instruction on student performance in a Pharmaceutics course. Unpublished manuscript, The University of Missouri-Kansas City. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/ sidocs/bsphar79.htm
This investigation sought to determine if Supplemental Instruction (S) would effect student performance in a physical pharmacy course at the University of Missouri-Kansas City. Mean scores on pretest, quizzes, first, second, and final examinations for the two groups (SI and non-SI participants) were compared by conducting a t-test. While scores for the non-SI group remained relatively constant, the SI participant group's academic performance improved throughout the academic term.

Shores, P., & Tiernan, J. (1996). Peer mentor training: A collaborative exercise in systemic change. Unpublished manuscript, University of Western Sydney at Nepean, New South Wales, Australia. Available: Ms. Penny Shores, Counseling and Health Unit, University of Western Sydney, Nepean, P. O. Box 10, Kingswood New South Wales 2747, Australia.
The Learning Center and the Counseling and Health Unit of the University of Western Sydney (Nepean, Australia) have been piloting a Peer Mentor program that is based on the American Supplemental Instruction (SI) program. The SI program is being used an a tool for systemic intervention at the institution by creating an environment for students to change their attitudes. The SI program is being used to serve the increasingly diverse population at the university. Much of the report centered on the training of the SI

leaders. Some faculty members also report using the SI program as a feed back mechanism to identify the comprehension level of the students regarding the classroom lectures.

Spencer, C., & Loh, H. (1994). Improving the learning style of first year Aboriginal & Torres Strait Islander nursing students studying anatomy. Paper presented at the Conference of Science in Nurse Education, Ballarat, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This report describes the use in 1994 of Supplemental Instruction (SI) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander (A&TSI) students. The local institutional name for the program is Peer Assisted Study Sessions (PASS). Many of these A&TSI students began postsecondary education with high anxiety (79% student response), low to medium confidence in passing their courses, limited knowledge of study skills, and high to moderate difficulty levels within their respective subjects. Based on qualitative research interviews with the A&TSI students, the majority reported they were more confident in passing anatomy after attending the SI sessions. Further, they reported that they were more motivated to perform better and most felt that the SI sessions helped them in developing study skills as their anxiety for the subject decreased.

Spencer, G. (1994). Supplemental Instruction: Adapt or die? Paper presented at the South African Association for Academic Development Conference, University of Natal, Durban, Republic of South Africa. Available from: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This unpublished manuscript describes the use of Supplemental Instruction (SI) at the University of Natal in South Africa. The SI model has been modified increasing the curriculum development focus potential of the model. Academic Development (AD) and Academic Support (AS)are seen as partners in improving teaching and learning. If AD and AS are seen as opposite ends of the learning continuum, SI is shifted toward the AD end of the continuum line in some South African institutions. Several of the modifications of the SI model include that the academic department: take ownership in administration of the SI program; faculty members take additional time to work with the SI leaders; faculty members recognize that changes need to be made regarding instructional delivery and content selection; faculty members modify their course delivery based on common themes of student comments; and key senior faculty members become highly involved in the SI program an ensuring that curriculum develop occurs.

Stockly, S. K. (1996, March). Closing the gap in technical skills: Supplemental Instruction and Mexican-American undergraduate women. Paper presented at the Annual Meeting of the Southwestern Sociological Association, Houston, TX. Available: Center for

Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/ssmexw96.htm This quasi-experimental study in Spring 1994 examines the performance of Mexican American women in an Introductory Economics course (Economics 302, Principals of Macroeconomics) at the University of Texas at Austin. Supplemental Instruction (SI) was offered as an academic enrichment program for students. SI participation rates were higher for women than men and students of color when compared with White students. The data suggest that SI participation had a positive correlation with increased mean final course grades in all comparison groups except Asian American women (White: men, 2.84 vs. 2.37 and women, 2.77 vs. 2.06; African American: men, 1.60 vs. 1.50 and women, 3.00 vs. 1.25; Asian American: men, 3.20 vs. 2.46 and women, 2.78 vs. 3.00; Hispanic: men, 2.10 vs. 1.60 and women, 2.38 vs. 1.46; and all students: 2.68 vs. 2.19).

Tanaka, C. (1995). Peer Assisted Study Sessions in HUB 661 Japanese. Unpublished manuscript, Queensland University of Technology, Brisbane, Queensland, Australia. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This research report documents the use of Peer Assisted Study Sessions (PASS) at Queensland University of Technology (Brisbane, Queensland, Australia) in HUB 661 Japanese language course. This course is often chosen as a second-semester, first year subject for International Business students. PASS is the local institutional name for the Supplemental Instruction (SI) program. Benefits of the PASS program for participants included slightly higher mean final course grades and lower rates of withdrawal. The professor who had PASS attached to his class reported receiving helpful feedback from the PASS leader concerning the comprehension level of the students. This afforded them an opportunity to revise lectures and review upcoming examinations. PASS leaders reported the following behavioral changes: learned how to give feedback to the course lecturer in an appropriate fashion; learned to work in harmony with other students and leaders; improved their own communication skills; improved their content knowledge and skill; and gained valuable insight into the learning process.

Tonsetic, R., & Warren, B. Z. (1997). Assisting faculty and students in adjusting to large class environments. Unpublished manuscript, The University of Central Florida, Orlando, FL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper discusses the use of Supplemental Instruction (SI) at the University of Central Florida (27,000 students) as one component in dealing with helping faculty and students deal with large classes. In Spring 1997 39 classes had an enrollment of 200 or more students. During Fall 1996 SI was provided for four large class sections including a chemistry course for non-science majors. SI participants earned a higher mean final course grade (3.39 vs. 1.72). When adjusted for differences in SAT scores, the SI group still received higher grades (2.54 vs. 1.71). The percent of A and B final course grades was higher for the SI group (47% vs. 20%) as well as lower rates of D, F or course

withdrawals (18% vs. 56%). Positive results were also reported for the SI in general biology and American national government. There were no significant differences in the calculus course. While there was high satisfaction with the SI participants, the grade differences were not significant. The authors suggest that the SI sessions in math need modification for more effective use. In addition, the authors administered several personality instruments for additional research. The Student Behavior Checklist (Long, 1985) examined the Long Reactive Personality Types with the SI participants and generated the following results: aggressive-independent (16%); aggressive-dependent (48%); passive-independent (8%); and passive-dependent (16%). Using the Long Personality Traits instrument the following results were generated concerning the SI participants: phobic (31%); compulsive (69%); impulsive (15%); and hysteric (32%).

Van Lanen, R. J., & Lockie, N. M. (1992). Addressing the challenge of student diversity: Impact of Supplemental Instruction on performance in a freshman level chemistry course. Unpublished manuscript, Saint Xavier University, Chicago, IL.
The paper is based on the results of a pilot research study designed to determine the effect of Supplemental Instruction (SI) attendance on the performance and retention of a diverse student population in Chemistry 108 for various levels of SI attendance and to determine relationships between demographic and academic variables of the sample and participation in SI. The sample consisted of Saint Xavier University (Chicago, IL) students enrolled in Chemistry 108 (N=61) in Fall, 1990 and Spring, 1991. Significant differences in performance in Chemistry for the SI group and the non-SI group, as measured by final course grades, were observed when the SI group was defined as students attending six or more SI sessions and the non-SI group was defined as students attending five or fewer SI sessions. Both academic variables and the demographic variables were compared for the SI group and for the non-SI group.

Wallace, J. (1993). The use of Supplemental Instruction in sub-degree vocational courses. London, England: Unpublished manuscript, Kingston University at Surrey, England. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA. http://www.umkc.edu/cad/si/sidocs/jwsdvc93.htm
This report describes the use of Supplemental Instruction (SI) with sub-degree vocational courses at Kingston University (London, UK). Kingston runs a number of sub-degree courses leading to the Higher National Diploma (HND) in Electronic Engineering which is obtained from the Business and Technology Education Council (BTEC) through the university. In October, 1990 SI was introduced into several courses in the Faculty of Technology at Kingston. Data from 1990 to 1991 suggests that SI participants received statistically ($p < .05$) higher final course grades (Mathematics: 60.9 percentile vs. 48.1 percentile; Circuits & Systems: 64.0 vs. 49.9; Electronic Principles: 60.0 vs. 49.4; Software Principles: 55.3 vs. 41.5; and Management Studies: 69.4 vs. 53.5). and had lower rates of withdrawal. In addition, interviews with SI

participants suggest that they also develop "transferable skills" that help them in other courses.

Watters, J. J., & Ginns, I. S. (1997). Peer assisted learning: Impact on self-efficacy and achievement. Paper presented at the American Educational Research Association Conference, March 24-28, 1997, Chicago, IL. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA.
This paper describes the use of program modeled after Supplemental Instruction (SI) in a teacher education course at Queensland University of Technology (Brisbane, Australia). The institutional name for the program is Peer Assisted Study Sessions (PASS). The class had 124 students enrolled in a course designed for first-year Bachelor of Education students. Program outcomes were that SI participants earned higher final course grades (4.88 vs. 4.15 on a scale of 0 to 7) and self-reported development regarding confidence and improved attitudes to learning and science. There was a trend for higher grade achievement with higher levels of attendance at the SI sessions. The SI leaders reported improved confidence, facilitatory skills, and insight into adult education.

Webster, T., & Malloch, C. (1997). Supplemental Instruction benefits students in a traditional and non-traditional introductory physics course: A two semester study. Unpublished manuscript, Rensselaer Polytechnic Institute. Available: Thomas Webster, The Advising and Learning Assistance Center, Rensselaer Polytechnic Institute, Troy, NY 12180.
After a review of the literature concerning physics education, this paper describes the use of Supplemental Instruction (SI) at Rensselaer Polytechnic Institute (Troy, NY). An introductory physics course (Physics 2) was studied during Fall 1996 and Spring 1997. The fall course was taught in the traditional method. The spring section of the course used the CUPLE Studio Physics Project and was much smaller the fall course. Students who received a D or F on the second exam were classified as "high-risk" and students who received a C on the same exam were designated as "at-risk." Students who attended SI received significantly ($p < .01$) higher mean final course grade (3.37 and 3.08 for the traditional and non-traditional learning environments, respectively) than those students who did not attend SI (3.09 and 2.44, respectively). Students who attended SI received a significantly ($p < .01$) lower rate of D and F final grades (1% and 5%, respectively) than the students who did not attend (8% and 37%, respectively). The data suggests that students who began to attend SI early and frequently (at least 6 times throughout the semester) benefitted more than SI than students who attended SI late in the semester or infrequently. Students who were classified as at-risk or high-risk and attended SI earned higher grades than their counterparts who did not attend SI sessions.

Whatman, S. (1995). Peer assisted study sessions with Aboriginal and Tores Strait Islander students during semester two, 1995. Unpublished manuscript, Queensland University of

Technology at Brisbane, Queensland, Australia.
This report describes the use in semester 2, 1995 of Peer Assisted Study Sessions (PASS) at Queensland University of Technology (Australia) with first year Aboriginal and Torres Strait Islander (A&TSI) students who were attending class at the Gardens Point Campus. PASS is the locally used name for Supplemental Instruction (SI). A&TSI students had typically experienced considerable difficulty in courses such as Information Technology and Business. These courses historically had low Indigenous student enrollments, and consequently, had very few successful graduates. Eight courses were selected for PASS support: Computer Applications, Software Development 1 & 2, Technology of Information Systems, Business Communication & Application Development, Theoretical Perspectives on Communication, Microeconomics, and Reporting Principles. Before introduction of the PASS program in the second semester, the A&TSI students as a group earned fairly low grades. At the end of the semester with PASS support, the students earned higher final course grades. PASS leaders reported the following benefits for themselves: more opportunity to talk with faculty members, greater understanding of course content which helped in other classes, and developed friendships with more students that they would normally would have not met.

Zerger, S. (1990). Supplemental Instruction: Learning through modeling. Unpublished manuscript, Bethel College at North Newton, KS. Available: http://www.umkc.edu/cad/si/sidocs/szmodel.htm
This unpublished manuscript describes the use of Supplemental Instruction (SI) to improve student learning. The paper focuses on explaining how learning occurs in SI, using the social learning theory described in Bandura to do so. According to Bandura, humans can and do learn most things through watching others. This capacity to learn by observation enables humans to acquire large integrated patterns more quickly than if they had to learn all via direct trial and error.

Section Nine: Internet Resources

Arendale, D. (Ed.). (1997). Internet homepages of other Supplemental Instruction programs around the world [On-line]. Available: http://www.umkc.edu/cad/si/sidocs/othhompg.htm
This document provides links to the Internet homepages of other Supplemental Instruction (SI) programs in the United States and abroad (South Africa, Sweden, and the United Kingdom.).

Arendale, D. (Ed.). (1999). Internet homepage for the National Center for Supplemental Instruction [On-line]. Available: http://www.umkc.edu/cad/si/
This Internet homepage maintained by the National Center for Supplemental Instruction at the University of Missouri-Kansas City provides a central location for information

about SI. Some of the menu items include: overview of SI; links to homepages of SI leaders at UMKC; information about upcoming SI Supervisor training workshops; instructions on how to subscribe to the SI listserv discussion group; SI materials for sale; directory of known SI homepages from other colleges around the world; and a directory of SI-related documents. Currently more than 100 documents are available for viewing at this site about SI by authors at UMKC and elsewhere.

Arendale, D. (Moderator). Supplemental Instruction Internet computer discussion listserv [On-line]. Kansas City, MO: The University of Missouri-Kansas, Center for Supplemental Instruction. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110. This moderated computer discussion listserv is provided by the National Center for Supplemental Instruction (SI). Discussion topics include: customizing SI for different content areas; strategies to increase SI attendance; methods to conduct qualitative and quantitative research; and other topics. Subscription to the listserv and is free to anyone, regardless of whether they have an active SI program or not. SI Leaders as well as SI Supervisors are especially invited to join the list. Approximately 250 persons from several countries are members of the listserv. To subscribe to the listserv, send an E-mail message to SInet-Request@cctr.umkc.edu In the body of the message type SUBSCRIBE SINET A confirmation message will be sent within an hour with more information regarding the listserv.

Section Ten: Newspaper and Other Media Coverage

Akao, S. E. (1996). Book review of Supplemental Instruction: Increasing achievement and retention. Journal of College Student Personnel, 37(3), 360
This is a book review of the monograph Supplemental Instruction: Increasing achievement and retention (Martin and Arendale, Editors, 1994). The book review provides a short summary of each of the monograph's chapters.

Associated Press. (1988, October 4). Dayton program 'grade A'. University of Dayton Newspaper, Dayton, OH, p. 8
This newspaper article provides an interview with Jim Melko, director of the University of Dayton (OH) concerning the use of Supplemental Instruction (SI) at the institution in the economics department with the microeconomics course. The course has been historically difficult for students due to the demand for higher order thinking and analytical skills and need to acquire and master the specific vocabulary of the economics discipline.

Bryson, D. (1987, March 8). Study sessions help medical students get over the hump of board tests. Daily American Republic Newspaper, Popular Bluff, MO, p. 5
This newspaper article describes an adaptation of the Supplemental Instruction (SI)

model with medical students who are studying to pass their licensure examination so that they may continue with their clinical studies. The article includes interviews with Dr. Robert Blanc, Coordinator of Curriculum Development at the UMKC medical school and Dr. Deanna Martin, Director of the Center for Academic Development. Some of the activities of the semester-length board preparation program mentioned by students interviewed in the article are: students learn how to work in groups to learn new material, students must be able to explain concepts to one another to assure understanding, students focus on the thinking process as much as the content, and students develop confidence in their ability to do well with challenging examinations.

Carbon, D. (1995, August 1). Universities give peer program top marks. Courier Mail Newspaper, Brisbane, Queensland, Australia, p. 25
This newspaper article reports on the implementation of Supplemental Instruction (SI) at three postsecondary institutions in Australia (Queensland University of Technology, University of Queensland, and the University of Southern Queensland). Henry Loh, QUT anatomy professor, reported reducing students' failure rate from 20 to 5 percent after the introduction of the SI program. However, he implemented the program more to increase academic performance than to just reduce student failure rates. Barbara Kelly of UQ reports that SI leaders regularly provide feedback to the course professors regarding the comprehension level of the students. At UQ the SI program is being used in biochemistry, microbiology, engineering, chemistry, and law. Kelly requires SI leaders to maintain diaries to record SI session activities, student behaviors, and suggestions to improve the program. SI leaders report improvement of their confidence levels, developed better communication skills, and believed that their employment prospects were improved.

Carroll, D. (1994, September 13). UMKC to work with South African school. The Kansas City Star Newspaper, Kansas City, MO, p. B3
This newspaper article describes an agreement between the University of Missouri-Kansas City and the University of Port Elizabeth in South Africa concerning the Supplemental Instruction (SI) program. UPE has been successfully using the SI program already for one year.

Chandler, J. (1994, December 24). Peer guidance tutors: Group study sessions led by 'A' students help some struggling with 'killer' math and science courses at community colleges. Los Angeles Times Newspaper, Los Angeles, CA, pp. B1, B6
This newspaper article describes the use of Supplemental Instruction (SI) program in several colleges in the Los Angeles, CA area (Pierce College, Glendale Community College, Cal State Northridge, Pasadena City College, Valley College in Van Nuys). At Pierce College in a biology course 76 percent of the SI participants earned a grade of A, B, or C while the non-SI participants earned a similar grade only 50 percent of the time. Glendale Community College has a large program with 50 SI leaders. A challenge mentioned by administrative leaders some of the SI programs was finding stable funding

to continue the program each year. Several interviewees mentioned that the SI program was important for all students, not just the ones in severe academic trouble.

Cobb, R. (1997). Learning is the lesson: Center illuminates path to understanding. Illinois State Scholar, 7(1), 16-17
This article describes the University Center for Learning Assistance at Illinois State University (Normal, IL). In an interview with Julia Visor, acting director of the center, an overview of the Supplemental Instruction (SI) program at the university is provided. During the Spring 1997 semester, SI was offered to students enrolled in Chemistry and Society, General Psychology, Principles of Microeconomics, Principles of Macroeconomics, Introduction to Non-Western Politics, American Government and Politics, History of the United States to 1865, and Human Biology. Some of the SI participants include students in Student Support Services, one of the federally-funded TRIO programs. A short summary of several research studies concerning SI's impact on affective variables conducted by Visor and others is shared.

Conroy, G. J. (1996, May 28). Supplemental Instruction program shows results first year. The Observer Newspaper, Edwardsville, IL, pp. 3-4
This newspaper article describes the use of Supplemental Instruction (SI) at Southern Illinois University at Edwardsville. SI sessions were offered in an introductory biological sciences course (Biology 120). The article indicated one of the SI program benefits was that SI leaders who were biology education majors learned pedagogical methods. The SI supervisor reported a preference for hiring education majors. According to data from Fall 1995 in Biology 120, SI participants to attended four or more sessions earned a mean grade of a low B, whereas those who attended one to three sessions averaged a C. Those who did not attend any SI sessions averaged a D.

Duckett, J. (1996, April 28). Tutors offers more than last-minute fix. The Morning Call Newspaper, Allentown, PA, p. E1
This newspaper article describes tutoring programs at colleges in the Allentown, PA area. Supplemental Instruction (SI) is used at Kutztown University.

Fisher, M. (1988, September 23). UD "ringers" succeeding academically. Dayton Daily News, Dayton, OH, p. 3
This newspaper article describes the use of Supplemental Instruction (SI) at the University of Dayton (OH).

Gentner, N. (1997, April 22). Queensland University of Technology to push Supplemental Instruction in local units. Inside QUT (Queensland University of Technology Newspaper), Brisbane, Queensland, Australia, p. 11
This newspaper article contains an interview with Kathy Phillips, Supplemental Instruction campus coordinator from The University of Missouri-Kansas City who was spending an academic term at the Queensland University of Technology (Australia). The SI program was started at QUT by Professor Ron Gardiner, then Associate Pro-

Vice-Chancellor (Academic) in 1992. At present SI is offered to 1,000 students in 12 course units in four faculties.

Gilinsky, R. (1985, October 20). Extra effort. New York Times Newspaper, New York City, NY, p. 10
This newspaper article provides an overview of the Supplemental Instruction (SI) program.

Henry, M. (1998, February 27). Faculty senate applauds recommendations. Lubbock Avalanche-Journal, Lubbock, TX, p. 7c
This newspaper article discusses the steps that Texas Tech Chancellor John Montford outlined to enhance academic performance of student-athletes. Supplemental Instruction (SI) was among the suggested activities. Four classes with high concentrations of student-athletes have SI provided as a service with an expansion to 10 to 12 classes for the following fall 1998 academic term.

Hensley, D. (1997, February 27). Montford vows to set new pace for Texas Tech University athletes. Lubbock Avalanche-Journal, Lubbock, TX, p. 7c
The Chancellor of Texas Tech University (Lubbock, TX) announces that the Supplemental Instruction (SI) program will be expanded at the institution as part of a comprehensive increase in academic support services for student-athletes. Due to several highly-publicized cases of poor academic performance by several athletes, the institution will provide: closely monitored study table; SI provided in more classes; tutors to students when they are out-of-town for athletic contests; and more closely monitored class attendance.

Hinckley, A. (1991, April). Students get paid to help others pass. The National College Newspaper, p. 23
This newspaper article describes the use of Supplemental Instruction (SI) program at Utah State University. Currently SI is offered in connection with two courses: economics and nutrition/food science. The SI program is administered through the Learning Assistance Center.

Hollenkamp, J. (1992, April 1). Supplemental Instructors help fellow students understand lectures, homework. Louisville Cardinal Newspaper, Louisville, KY, p. 10
This newspaper describes the use of Supplemental Instruction (SI) with students at the University of Louisville (KY) since 1984. Each academic term SI is offered in a dozen courses for the following academic departments: accounting, biology, chemistry, EMCS, geography, HED, history, ISDP, math, physics, political science, and sociology.

Horsley, L. (1991, September 19). UMKC pioneers a 'survival course': Study skills program gives students the help they need to succeed. The Kansas City Star Newspaper, Kansas City, MO, pp. 1, 6
This newspaper article provides an overview of the Supplemental Instruction (SI)

program at the University of Missouri-Kansas City. The article provides an interview with Deanna Martin -- SI's creator -- as well as several other SI supervisors and SI leaders. Dr. Gary Widmar, UMKC Vice Chancellor for Student Affairs, estimates that for every dollar invested in the SI program for staff salaries, the university receives back six dollars due to higher reenrollment and graduation rates of SI participants. Martin shares that the SI program is expanding to the United Kingdom and the Artic Circle.

Kastor, E. (1984, April 2). Education: Reading, 'riting and reasoning. Washington Post Newspaper, Washington, D.C., p. B5
This newspaper article provides an overview of the Supplemental Instruction (SI) program and its use to develop reasoning skills. Research suggests that half of all students entering college lack the basic reasoning skills to completely understand the content of their courses. It contains an interview of Deanna Martin, creator of the SI program.

Klein, D. (1990, January 16). Program lets students teach class: Volunteers from biology classes are taught how to think. Daily Kent Stater Newspaper, Kent, OH, p. 8
This newspaper article provides an overview of the Supplemental Instruction (SI) program at Kent State University (OH). Lowell Orr and LaVerne White from the biology department reported that SI participants earned higher mean final course grades in two courses: "Cells and Systems" and "Strategies for Survival in the Biological World." Students with high attendance patterns (10 or more times per term) generally receive a final course grade one full letter grade higher than non-SI participants.

Landwehr, R. (1995, July 21). Age of reason: Older students propel universities to shift boundaries. Kansas City Business Journal, Kansas City, MO, pp. 21-22
This newspaper article discusses how a variety of universities are adjusting to the needs and requirements of older students. In an interview with Dr. Kay Blair of the University of Missouri-Kansas City, a short overview of the Video-based Supplemental Instruction (VSI) program is given. Blair listed the following benefits of the VSI program for students: bridges the gap between lectures and learning; helps students to prepare for the rigor of traditional undergraduate courses; fosters collaboration and team-building which are critical skills for the world of work; and taps the individual expertise of the students.

Levine, P. (1975, November 13). 'Whiz-Kids' and troubled flock to learning center. UNews (University of Missouri-Kansas City Student Newspaper), Kansas City, MO, pp. 1, 13
This newspaper article describes the use of Supplemental Instruction (SI) with some of the most gifted students at the University of Missouri-Kansas City. Skills that these students used in high school are not sufficient for the academic rigor experienced at the university.

Levy, T. (1991, October 14). Students get into the upliftment business. Business Day Newspaper, Wits, South Africa, p. 10

This newspaper article describes the use of Supplemental Instruction (SI) at Wits University in South Africa. The SI program will be started by commerce students at the university. The SI program will be aimed at assisting Black students who have been disadvantaged by the secondary school system.

Lupkin, M. (1994, July 28). Linking science to students' lives. This summer program offers academic aid to minorities. Philadelphia Inquirer Newspaper, Philadelphia, PA, p. 3
This newspaper articles mentions that Supplemental Instruction (SI) is a component in a special program for minority students at Rutgers University at Camden (PA) called "Success in the Sciences." Students are brought in for a special four-week enrichment program before the beginning of the freshman year to prepare them for the rigor of courses at Rutgers. SI is offered in connection with their first-year courses in math, chemistry and biology. The program has been partly funded with a $500,000 grant from the William Penn Foundation and $50,000 grant from the Coca-Cola Foundation.

Makins, V. (1991, July 5). Passing on a year's experience: How peer tutors at Kingston Polytechnic help students combat isolation. The London Times, London, England, pp. 1-3. Available: http://www.umkc.edu/cad/si/sidocs/vmsiuk91.htm
The article describes how Kingston Polytechnic in England has customized the use of Supplemental Instruction (SI) at their institution. The campus SI supervisor reports that a challenge in the SI sessions is the requirement that SI leaders redirect all questions back to the SI participants to answer.

McMichale, E. (1994, November 29). 'Natural teachers:' Tutors work alongside students in "K' program. Kalamazoo Gazette, Kalamazoo, MI, p. C1
This newspaper article describes the use of Supplemental Instruction (SI) at Western Michigan University located in Kalamazoo, Michigan.

Meikle, J. (1993, February 16). Learning to help others. Guardian Education Newspaper, London, England, p. 10
This newspaper article describes the use of Supplemental Instruction (SI) at Kingston University in the United Kingdom. In an interview with Jenni Wallace, SI Certified Trainer for the United Kingdom, she explains that SI sessions are positioned between the classroom lectures by the professor and the tutorial sessions. The SI sessions help students to be better prepared to maximize their time spent in the tutorial sessions. There are reports that former SI leaders and participants in succeeding academic terms form their own study groups in classes where formal SI sessions are not offered. Former SI leaders report that potential employers are impressed with the skills that they developed as facilitators of the study groups.

Millard, M. (1995, October 19). First African-American to hold post: New Chancellor at City College helps win $1.67 million grant. The Sun Reporter, San Francisco, CA, p. 1
This newspaper article describes how Del Anderson, the new Chancellor of San Francisco City College (CA), will use a $1.67 Title III grant from USDOE to help

students in "high risk" courses and to bring the Internet into the classroom. The chancellor, formerly president of San Jose City College, mentioned that she had developed many programs for students of color to help them achieve higher transfer and graduation rates.

Murray, L. (1997, October 24). New program relies on peer instruction. The Daily Reveille (Louisiana State University School Newspaper), Baton Rouge, LA, p. 7. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This newspaper article provides a basic overview of the Supplemental Instruction (SI) model. SI will be implemented on the Louisiana State University campus in Spring 1998.

Oliver, R. (1994 July). University of Port Elizabeth rector on the right road. Eastern Province Herald Newspaper, Port Elizabeth, South Africa, p. 11
This newspaper article reports on the signing of an agreement between the University of Missouri-Kansas City and the University of Port Elizabeth in South Africa concerning Supplemental Instruction (SI). UPE is implementing the SI program to help bridge the gap caused by differences in the education systems in the country.

Pappas, J. G. (1997, June 5). Pappas praises Supplemental Instruction program. Central Washington University Observer, Ellensburg, WA, p. 5
This newspaper article by the Dean of Academic Services at Central Washington University describes the use of Supplemental Instruction (SI) program at the institution. The data from the institution suggest that SI participants earn higher mean final course grades. A higher than estimated number of students (69 percent) participate in the program.

Perrone-Saneski, C. (1984, May 13). Course sharpens freshmen's reasoning skills. Troy Times Newspaper, Troy, NY, p. 1
This newspaper article provides an overview of the Supplemental Instruction (SI) program. The article contains an interview with Deanna Martin, SI's creator. According to Martin, as many as 50 percent of college freshmen do not have the learning skills necessary to understand their coursework since they lack advanced reasoning skills. Martin was in Albany, NY presenting a seminar sponsored by the ACT National Center for the Advancement of Educational Practices concerning the use of SI in improving academic performance of students.

Rizvi, T. (1997, June 16). Law students give each other help, reduce failure rate. Campus Report: The University of Dayton Newspaper, Dayton, OH, p. 1
This newspaper article describes the use of an academic support program modeled after Supplemental Instruction (SI) with first-year law students at the University of Dayton (OH). Interviews with faculty members and students emphasized that the program was not about students being underprepared, rather it was to help students bridge into a

different learning style. The failure rate for students of color involved in the program have dropped from 30 percent three years ago to 6.5 percent last year. The article also contains an interview with David Arendale from the University of Missouri-Kansas City where the SI program has been used for five years in the UMKC School of Law with similar positive results.

Rizvi, T. (1988, September 23). Study with a buddy: Supplemental Instruction fills the learning gap. Campus Report: The University of Dayton Newspaper, Dayton, OH, p. 1
This newspaper article describes the use of Supplemental Instruction (SI) in ECO 203 Microeconomics and ECO 204 Macroeconomics at the University of Dayton (OH).

Ruth, D. (1987, March 7). Education bill helped economy. The Times Picayune, LA, p. A-18
This newspaper article mentions that Supplemental Instruction (SI) is being used at the University of New Orleans with introductory courses in business administration, sociology and Afro-American culture. In these classes students are passing the courses at a rate of 73 percent. Before introduction of SI the pass rate was less than 50 percent.

Sawyer, J. (1990, October 26). University of Missouri involved in project with South Africans. St. Louis Post-Dispatch, St. Louis, MO, p. 15
This newspaper article provides an overview of the Supplemental Instruction (SI) program as it is being implemented at the University of the Western Cape (UWC) in Cape Town, South Africa. The article reports on trips by UMKC's Larry De Buhr who went to UWC in 1987 and 1989 to help introduce the SI program.

Schecker, F. (1982, March 29). Program gives boost to students. The Kansas City Star Newspaper, Kansas City, MO, p. 3A
This newspaper article provides an overview of the Supplemental Instruction program at the University of Missouri-Kansas City.

Schuldt, G. (1991, May 15). Group tutoring program a success. Milwaukee Sentinel Newspaper, Milwaukee, WI, p. 10
This newspaper article describes the use of Supplemental Instruction (SI) at Milwaukee Area Technical College (WI). Some of the courses that SI is offered include Intermediate Algebra, Introduction to Human Services, Oral Anatomy, Introduction to Occupational Therapy and nine other courses. Data from two courses was reported in the newspaper article. SI participants earned higher mean final course grades than non-SI participants: Oral Anatomy (3.0 vs. 2.2) and Introduction to Occupational Therapy (3.5 vs. 2.3).

Schuss, D. G. (1999, May 30). Many top college students use tutors to keep an edge: Study sessions aren't just for catching up. The Boston Globe, Boston, MA, p. D5
This newspaper article describes the use of Supplemental Instruction (SI) and other forms of academic assistance at highly-selected post secondary institutions such as Worcester Polytechnic Institute, Harvard University, Wellesley College, Dartmouth

College, Salem State College, and University of Massachusetts/Amherst. Interviews with campus administrators and students suggested the following reasons for interest in SI and other forms of academic enrichment: maintain top class rankings, improve study strategies, understand class lectures from another perspective, and to improve student persistence towards graduation.

Simpson, S. (1994, February 23). How to learn by example. The Scotsman Education, Glasgow, Scotland, p. 22
This newspaper article describes the use of Supplemental Instruction (SI) at Glasgow Caledonian University in Scotland. The local name for the SI program is Peer Assisted Study Sessions (PASS). The article contained interviews with several students who mentioned some of the benefits of the SI program: filled gaps in knowledge; develop strategies to work out their own answers; provided a transition into difficult courses; encouraged students to form their own study groups in other classes were SI was not offered; and helped to deal with the high volume of material.

Sowa-Jamrok, C. (1994, July 24). Smaller classes attract students. Chicago Tribune Newspaper, Chicago, IL, p. 17
This newspaper article mentions that Supplemental Instruction (SI) is one of the strategies used at National-Louis University (Chicago, IL) to help students be more active when they are enrolled in large classes. Ofra Peled, who teaches biology and microbiology mentioned that one of the activities used in SI sessions is to have students write about the class lecture material. They write about a lecture concept, discuss it with a few students in a small group, and then after practicing they share about the concept in the next class lecture.

Spofford, T. (1990, October 1). Top students pitch in to lower dropout rates: Peer-run study groups help keep freshmen in college. The Times Union Newspaper, Albany, NY, pp. A1, A12
This newspaper article provides an overview of the Supplemental Instruction (SI) program at the State University of Albany (Albany, NY), Hudson Valley Community College (Troy, NY), The College of Saint Rose (Albany, NY), Rensselaer Polytechnic Institute (Troy, NY), and Skidmore College (Saratoga Spring, NY). Some data from some of the programs and interviews with SI Supervisors and SI leaders also is included. Institutions reported a variety of compensation systems for the SI leaders. At SUNYA they receive three college credits. Most others paid an hourly wage of $5.00 to $6.00. At Rennsselaer the SI leaders receive $1,100 a year, free meals, and a $500 discount on a room in the freshman dormitory.

Staff writer. (1993, November 1). Academic programme at QUT well supported. The Chinese Business and Professional Association of Queensland Newsletter, 47(66)
This newsletter article describes the use of Supplemental Instruction (SI) at the Queensland University of Technology (Brisbane, Australia).

Staff writer. (1994, June 4). SAU's tutoring gets high ratings. Banner-News, Magnolia, AR, p. 15
The newspaper article mentions that Supplemental Instruction (SI) program is an important part of academic support services at Southern Arkansas University. Preliminary results from the Noel-Levitz Student Satisfaction Inventory suggested that students were very high in comparison with other institutions in the U.S. SAU was one of the institutions that participated in the national survey.

Staff writer. (1995, August 2). Students helping boost pass rates. The University of Southern Queensland Newspaper, Toowoomba, Queensland, Australia, p. 5
This newspaper articles describes the implementation of Supplemental Instruction (SI) at the University of Southern Queensland at Toowoomba in the Nursing Department during Fall 1995. In addition to describing the academic benefits to the SI participants, the USQ SI coordinator, David Anderson, reports that a value for SI leaders is that the experience provides leadership development and increases their post-graduate opportunities.

Staff writer. (1995, July 7). Survey shows many study hours wasted. Campus Review, Australia,
This newspaper article describes the use of Supplemental Instruction (SI). It mentions that the SI program has been adopted for use in several Australian institutions: University of Southern Queensland in Toowoomba, University of Queensland, and the Queensland University of Technology.

Staff writer. (1991, March 12). Making the grade: Supplemental Instruction program lets students help other students learn. The Oscoda County Herald, Roscommon, MI, p. 14
This newspaper article provides an overview of the Supplemental Instruction (SI) program at Kirtland Community College (MI). Data from SI sessions in biology and chemistry during Fall 1990 suggest that SI participants earned higher mean final course grades than non-SI participants (chemistry: 2.25 vs. 1.22; biology: 2.56 vs. 1.22).

Staff writer. (1991, February 14). Supplemental Instruction program aims to help students earn better grades. The Blue and White Flash: Jackson State University Newspaper, Jackson, MS, p. 4
The newspaper article provided an overview of the Supplemental Instruction (SI) program that is being implemented at Jackson State University (MS) in the following academic areas: art, English, history, mass communication, music, and urban affairs.

Staff writer. (1998, January 16). Supplemental Instruction program at UMKC leads the way. Inside UMKC Newsletter, Kansas City, MO, p. 1
This newsletter article describes how the Supplemental Instruction program was featured at a conference hosted by the U.S. Department of Education called "Replacing Remediation in Higher Education" that was hosted at Stanford University on January 26-

27, 1998. SI was one of only five programs to be presented at the invitation-only conference.

Staff writer. (1990, August 16). UMKC program improves grades, retention of students in college. Kirksville Daily Express, Kirksville, MO, p. 1
This newspaper article provides a basic overview of the Supplemental Instruction (SI) program.

Staff writer. (1997, October 17). Jim Falls: Fun on tape and in person. UMKC Inside (University of Missouri-Kansas City Newsletter), Kansas City, MO, p. 1
This newsletter article describes a report concerning the VSI program. Dr. Jim Falls, one of the professors who has placed his course on video, is featured in the article. Dr. Falls' VSI section of his on-campus introduction to western civilization history class is also accepted for dual high-school credit as well.

Staff writer. (1996, January 18). Stet R-XV participates in VSI. Stet Newspaper, Stet, MO, p. 8
This newspaper article describes the involvement of the Stet High School (MO) with the Video-based Supplemental Instruction (VSI) program. Several Missouri state congressional leaders observed the VSI program operating at the high school.

Staff writer. (1995, July 18). New learning process to help first-year University of Southern Queensland students. The Chronicle Newspaper, Toowoomba, Queensland, Australia, p. 8
The newspaper article describes the use of Supplemental Instruction (SI) at the nursing department at the University of Southern Queensland in Australia. In the article Deanna Martin, creator of the SI model, provided an overview of the SI program while she was visiting the university.

Staff writer. (1997, August 19). Engineering course lifts grades and retention rates. Inside QUT (Queensland University of Technology, Australia), p. 2. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110
Dr. Martin Murray from Queensland University of Technology in Australia is using Peer-Assisted Study Sessions (PASS) to improve student performance in engineering courses. PASS is the locally used name for the Supplemental Instruction (SI) program. PASS was one of several new additions to the course delivery system that both increased student academic achievement but also lowered the cost of instruction.

Staff writer. (1990, November 19). Education student gets SCUP of reality at Westport High. University News (Student Newspaper of the University of Missouri-Kansas City), Kansas City, MO, p. 4
The newspaper article describes the use of Supplemental Instruction (SI) with high school students enrolled in English and history classes at an urban high school in Kansas

City, MO. Students from the UMKC School of Education were some of persons who served as SI leaders. The article contains an interview with an education major who commented on the positive impact of the experience of working with high school students early in the education degree program rather until the field teaching experience in a school as an upper classman.

Staff writer. (1996, September 24). Wayne State University retention efforts help students stay in school. Michigan Chronicle Newspaper, Detroit, MI, p. 10A
This newspaper article describes the use of Supplemental Instruction (SI) at Wayne State University (Detroit, MI).Wayne Excel, the university's comprehensive retention program model was implemented in fall 1991. Excel provides a high level of advising and academic support services for at-risk students during their first two years at WSU. SI is one of the components of the Excel program. Institutional research shows that student retention has increased since the Excel program was started.

Staff writer. (1993, September 28). US experts focus on teaching strategies. Inside QUT (Queensland University of Technology Newspaper), Brisbane, Queensland, Australia, p. 2. Available: Center for Supplemental Instruction, University of Missouri-Kansas City, 5014 Rockhill Road, SASS #210, Kansas City, MO 64110 USA
This newspaper article describes the upcoming arrival of Deanna Martin and Robert Blanc from the University of Missouri-Kansas City to conduct a Supplemental Instruction (SI) Supervisor training workshop at Queensland University of Technology (Brisbane, Australia). The visit to QUT will be supported by the Higher Education Research and Development Society of Australasia. SI is recognized at QUT as one of the teaching strategies which helped the university win the national Good Universities Guide 1993 University of the Year award.

Staff writer. (1992, July 29). College 'mini-grants' awarded. San Jose Mercury News, San Jose, CA, p. 3
This newspaper article describes 14 grants that were awarded by the San Jose/Evergreen Community College District to teachers for projects to help improve classroom instruction and student services at their colleges. The grants were created to stimulate innovation and creativity, especially in the areas of staff diversity, recruitment of underrepresented groups, retention, and new technologies and enrollment reduction caused by budget restraints. Susan L. Smith received a special grant for Supplemental Instruction.

Stiles, T. (1985, November 6). Study guides help freshmen take note of differences in learning at college. Chicago Tribune Newspaper, Chicago, IL, p. 2
This newspaper article provides an overview of the Supplemental Instruction (SI) program. The article discusses the transition shock experienced by many former high school students who were academically successful at the secondary level but are now facing academic difficulty in the more rigorous college environment. Deanna Martin, creator of the SI program, is quoted in the article.

Sulski, J. (1991, January 6). Keeping minorities in college. Schools growing more sensitive to students' needs. Chicago Tribune Newspaper, Chicago, IL, p. 4
This newspaper article mentions that Supplemental Instruction (SI) is one of the activities that is used to improve student achievement of Hispanic students. The Latin American Recruitment and Educational Services (LARES) program is directed by Leonard Ramirez at the University of Illinois at Chicago. SI is a component of the LARES program to help students develop their study strategies and writing skills.

Summers, D. (1995, December 12). Video-based instruction offers alternatives. University News (University of Missouri-Kansas City Student Newspaper), Kansas City, MO, p. 11
This campus newspaper articles describes the use of Video-based Supplemental Instruction (VSI) to deliver a college introductory history course to students at the University of Missouri-Kansas City. The article provides a brief overview and a few statistics about the higher grades and lower course withdrawal rates for VSI students as compared with students who enroll in the identical course taught by the same professor who previously placed his class lectures on the VSI videotapes.

Sutton, K. (1994, February 5). Deanna Martin aids University of Port Elizabeth to chop failure rate. Eastern Providence Herald Newspaper, Port Elizabeth, South Africa, p. 7
This newspaper article contains an interview of Deanna Martin who is creator of the Supplemental Instruction (SI) model. The interview describes the development of the SI model in the United States and its implementation at institutions worldwide. Included is a description of the role of Dr. Andre Havenga in developing the program at the University of Port Elizabeth in South Africa.

United Press International. (1990, August 16). UMKC program improves grades, retention of students in college. Kirksville Daily News, Kirksville, MO, pp. 1-2
The newspaper article carried by United Press International (UPI) provides a short overview of the Supplemental Instruction (SI) program.

Weil, D. (1996, April 23). New program focuses on high-risk courses. The Alestle Newspaper, Edwardsville, IL, pp. 1, 4
This newspaper article describes the use of Supplemental Instruction (SI) program at Southern Illinois University at Edwardsville in the biology department. Dr. Gertraude Wittig, coordinator of the SI program in the biology department, said that SI is different from traditional tutoring since students are actively involved in the sessions and focus is placed on development of both learning skills and content mastery.

Weiner, R. (1995, December 4). Community college students get help from 'old pros' people who have already passed classes give newcomers a boost. St. Louis Post Dispatch Newspaper, St. Louis, MO, p. 1
This newspaper article describes the use of Supplemental Instruction (SI) at two area community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Meramec's president, Richard

Black, said that the SI program was part of a program to ensure accountability in education to improve its effectiveness in serving students.

Weiner, R. (1995, December 7). Community colleges' program helps students help each other. St. Louis Post-Dispatch Newspaper, St. Louis, MO, p. 3
This newspaper articles describes the use of Supplemental Instruction (SI) at two community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Gwen Nixon, who administers academic support programs at Florissant Valley said that success rates rose by ten percent in Spring 1995 in courses where SI was offered. SI is offered in the following courses at Florissant Valley: American history, economics, accounting, college algebra, chemistry, and biology. Willis Loy, Associate Dean for Mathematics and Communications at Meramec stated that the SI program is cost effective since it only takes the retention of one student who would have withdrawn from a course to pay for the salary of the SI leader.

Weiner, R. (1995, November 30). College officials tout new program. Students having trouble in class can get extra instruction. St. Louis Post Dispatch Newspaper, St. Louis, MO, p. 2
This newspaper article describes the use of Supplemental Instruction (SI) at two area community colleges in the St. Louis, MO area (St. Louis Community College-Meramec and St. Louis Community College-Florissant Valley). Meramec's president, Richard Black, said that the SI program was tied to the State of Missouri's Funding for Results program that rewards colleges for achieving results.

Whiteside, D. (1995, December 20). Capitol News Release. Jefferson City, MO:
This news release provides information about Missouri State Representative Whiteside's visit to see the Video-based Supplemental Instruction (VSI) program as was viewed by a delegation led by him. The VSI program was reviewed at the Mendon, Norborne, and Stet high schools.

Wiethop, C. (1985, March 15). Supplemental Instruction planned. Current (University of Missouri-St. Louis Student Newspaper), 1-3
This newspaper article describes the implementation of the Supplemental Instruction (SI) program on the campus of the University of Missouri-St. Louis.

Wood, T. (1984, September 10). Plan aims at making students better thinkers. The Kansas City Star Newspaper, Kansas City, MO, pp. 1A, 5A
The newspaper article provides an overview of the Supplemental Instruction (SI) program. The article contains an interview with several SI personnel -- including Deanna Martin, creator of the SI program -- and faculty members who have SI attached to their class. Faculty report support for the program for the following reasons: do not have to spend time in class repeating content material since it can be discussed more fully in SI sessions; improves academic performance of students; and does not infringe

upon the tradition of the professor's role in the learning process. In the Foundations of Philosophy course the SI participants received a mean final course grade of 2.3 (out of 4.0) as compared with 1.4 for non-SI participants.

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VITA

David Ray Arendale was born on March 5, 1956, in Olathe, Kansas. He was educated in local public schools and graduated from Olathe High School in 1974. He received a scholarship to Emporia State University (ESU) in Emporia, Kansas, from which he graduated in 1977 with honors. His degree was a Bachelor of Science in History and Philosophy. Arendale was accepted into the ESU graduate school for a Master's degree in history. He received an appointment as Academic Intern during this time.

Before completing his graduate degree, Arendale accepted a teaching position at Pratt Community College in Pratt, Kansas during 1979. He taught a variety of history and social science courses and served as a instructional television producer/director. In 1985 he completed his Master's degree in history at ESU with honors. He established the first Learning Center at the college through funding provided by a U.S. Department of Education Title III grant.

In 1987 Arendale accepted a position at Highland Community College in Highland, Kansas as Director of the Learning Center. In addition to his duties related to the Learning Center, he also directed several grant programs. In 1989 Arendale was accepted for graduate studies at the Kellogg Institute for Developmental Education located at Appalachian State University in Boone, North Carolina. He completed a Certificate in Developmental Education through the Kellogg Institute in 1990.

During Fall 1989 Arendale joined the staff at the Center for Academic Development at the University of Missouri-Kansas City as Assistant Director of the Center. He began his work toward his Ph.D. in Education at the University of Missouri-Kansas City in the Fall of 1990. He completed an Educational Specialist degree in 1991 in Higher Education Administration. During this same year Arendale was promoted to Associate Director.

During the 1980s and 1990s Arendale became extensively involved with professional associations. With the National Association for Developmental Education he has served a variety of roles: national president, regional chapter president, national conference co-chair, reviewer for various awards and program certifications, content editor for the association web page, and member of several committees.

Arendale has been heavily involved with dissemination and scholarly activities in the following activities: frequent facilitator for training faculty and staff from other postsecondary institutions to implement Supplemental Instruction programs; more than 160 keynote and concurrent presentations; and conducted workshops at international, national and regional professional conferences. Arendale has authored or edited more than 80 articles, monographs, and videotapes. He serves on the advisory board for the National Center for Developmental Education and the editorial board of the Journal of Developmental Education. The American Council for Developmental Education Associations selected him as a Distinguished Fellow in 2000 which is the highest honor bestowed within the profession.

Arendale was promoted to Associate Director and then Interim Director in Fall of 1999. Upon completion of his degree requirements, Arendale plans to continue his career in developmental education and research interests.

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